SERVICE MANUAL

HIGH-RESOLUTION DISPLAY MONITOR

THN9105 series

Baugleich: DELL 21TE

MITSUBISHI ELECTRIC CORPORATION
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CBB-S5586

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1. Specification

This display monitor made by MITSUBISHI COLOR MONITOR SPECIFICATION.

2. Circuit explanation

2.1 Power supply block

2.1.1. General

(1) The power supply block corresponds to AC100-120V and 220-240V.

(2) The power supply block is configured of the fly-back converter type switching power supply that has pseudo-common operation by a separate excitation control IC. By feeding back the output voltage from the secondary side, the power is controlled so that it is not affected by the output voltage changes caused by the AC input voltage fluctuation and secondary side load fluctuation.

(3) The secondary side output of this power supply block is as shown in Table 2.1.

Table 2.1

Output voltage	Main load
200V	Horizontal deflection, high-voltage circuit
120V	Vertical circuit
70V	Video circuit
20V	Vertical circuit
14V	Horizontal deflection, high-voltage circuit, vertical circuit, horizontal drive circuit, video circuit, control circuit
12V	Control circuit
5V	Control circuit
-5V	Control circuit
8.5V	CRT heater
-8.5V	-5V circuit
-12V	Control circuit
-20V	Vertical circuit, -12V circuit
+B +4V	Horizontal position circuit
+B -4V	

2.1.2 Rectifying smoothing circuit

The AC input voltage is rectified with the diode bridge in IC901 and is smoothed with C905. The resistors R902 and R906 are mounted to limit the rush current when the power switch is turned ON. When C906 is charged, the IC901 thyristor turns ON and bypasses R902 and R906 to eliminate the power loss caused by R902 and R906.

2.1.3 Demagnetizing circuit

(1) This unit has an automatic and manual demagnetizing circuit.
This circuit prevents a drop in the screen quality due to magnetization of the CRT. The automatic demagnetizing circuit functions as described below when the power is turned ON.

(2) When the demagnetizing signal from the CPU is supplied to Q902, Q902 functions the conductivity relay RY901 with that signal.
With this, a current is flowed to the demagnetizing coil and demagnetizing takes place.
This demagnetizing time is approx. five seconds.

(3) The manual demagnetizing circuit executes the demagnetizing with the same type of operation as above when the demagnetizing switch on the front panel is pressed and the demagnetizing signal is output from the CPU.

2.1.4 Primary circuit

(1) Starting and constant voltage operation

The operation of the power supply circuit is explained below. When the power switch is turned ON, the start current passes through R917 and charges C912. When the IC902 PIN-(9) voltage reaches approx. 8V, IC902 begins operation. Next, the output voltage constant voltage operation takes place by controlling the ON time of the IC902 power transistor. A current corresponding to the voltage output form the output voltage detection circuit (error amplifier) IC951 installed on the secondary side output is flowed from the photocoupler IC904 connected to PIN-(7) of the feedback terminal IC902. The charge current of C1 in the IC902 is changed by this flowed current.

(2) Power management

When Q954 turns OFF with the power management or with the circuit protector signal, a current will flow to the photocoupler IC904 via R954 and D957. Each output voltage will start to drop, and will stabilize when the 70V output voltage reaches Vs.

$$V_S=V_R\ (R953) + V_Z\ (D958) + V_{BE}\ (Q953 + Q955)$$

At this time, the voltage at both ends of C955, which is the power voltage of the CPU, will also drop, and the CPU drive will be prevented. A stable supply of power for the CPU is possible by flowing a current from C966 via R951 and Q952 while Q953 and Q955 are ON.

The voltage of the primary side coil will also drop with the coil ratio of the 70V output voltage, so during power management supply the power from C913 to VIN terminal PIN-(9) via Q901.

The above is the state during power management suspension and circuit protection operation. In addition to this, if Q957 turns OFF with the power OFF signal and the CRT heater line is opened, the power management power OFF mode state will be entered.

(3) Protective function

The overcurrent protection (OCP), overvoltage protection (OVP) and overheat protection (TSD) functions are available. OVP and TSD are circuits that prevent the power circuit operation by operating the latch function and keeping the oscillator output at low.

Restarting is possible by turning the power switch OFF and ON.

Fig. 2.1

IC902 STR-S6709

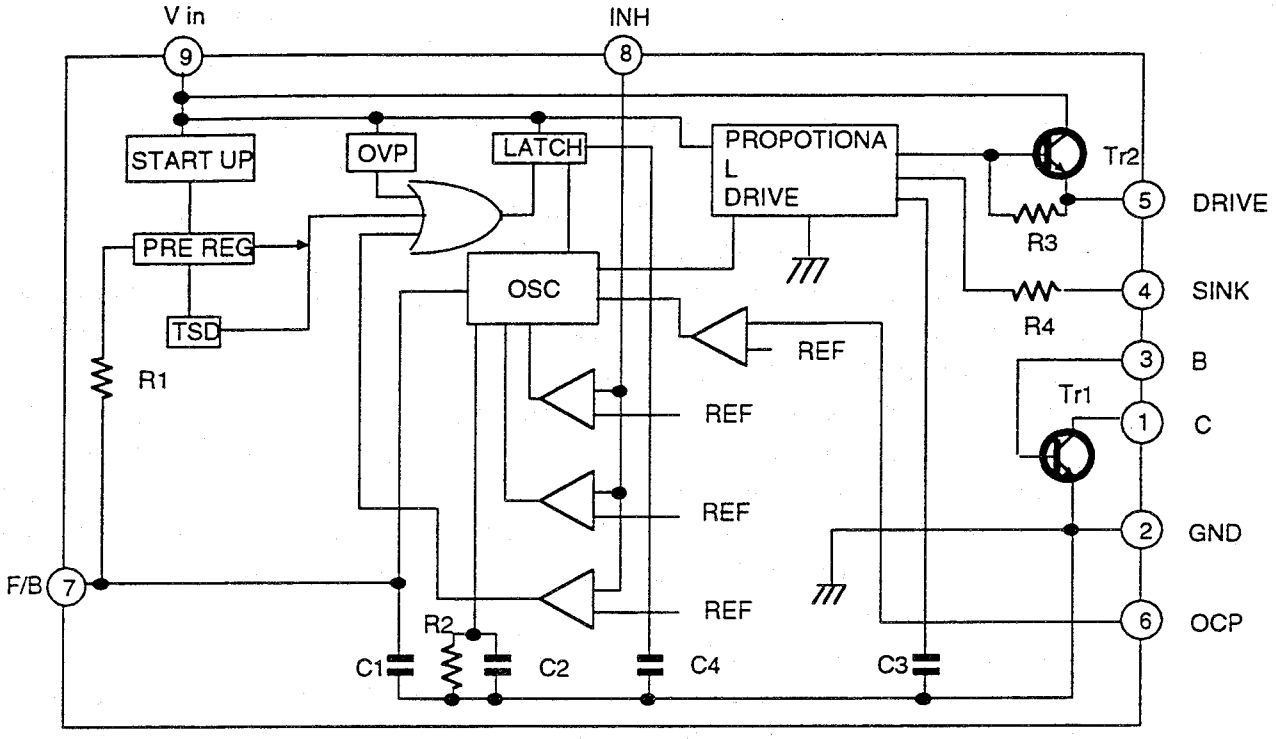
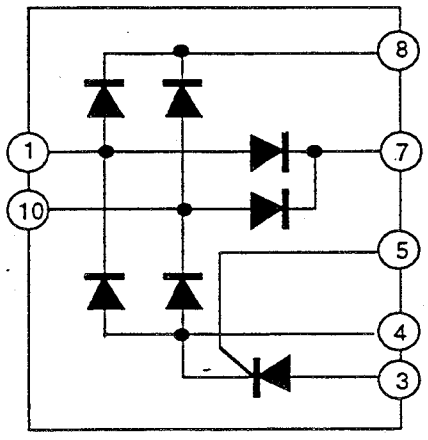


Fig. 2.2

IC901 MJ2400



2.2 Deflection block

The deflection system is configured of the horizontal, vertical and high-voltage circuits.

2.2.1 Horizontal deflection circuit

(1) The theory of the horizontal deflection operation is as shown in Fig. 2.3. Q506 functions as the horizontal output, and D510, D547, D548, D508 and D509 as dumper diodes.
Q515 to Q520 changeover according to the horizontal frequency to compensate the horizontal linear ity.

(2) The horizontal output transistor Q506 passes through Q531, Q545 and Q546 at the circuit diagram, and is turned ON/OFF by the IC700 PIN-16 drive pulse via the control PCB IC701.
While Q506 is ON, the deflection current 1DY is increased from 0 to a maximum of Ip according to the following expression.

$$Ip = (Vcc/LDy) \times Ton$$

(LDy: Parallel value of horizontal output transformer and DY)
When the drive pulse becomes a negative polarity, Q506 turns OFF, and IDy flows until Vcp is charged to $\{1 + (\pi/2) \times (Ts/Tr)\}$. When Vcp reaches the maximum value, the charge accumulated in C510 to C513 is flowed to Dy as the electrical discharge current.
This charge discharge period is called the "retrace period", and is expressed with the following ex pression.

$$Tr = \pi\sqrt{LDy\ Cr}$$

When Vcp reaches 0, the dumper diode turns ON, and IDy flows from -IP to 0 amperes. The Q506 ON period and dumper diode ON timer are set so that they overlap at the IDy 0 ampere point, so cross over distortion does not occur at the IDy 0 ampere point.
D547, D548, D508 and D509 are high-speed dumper diodes that flow an excessive current, and the main dumper voltage flows through D510.
The horizontal output transformer T501 connects the power in parallel with the deflection yoke, and functions as a choke coil.

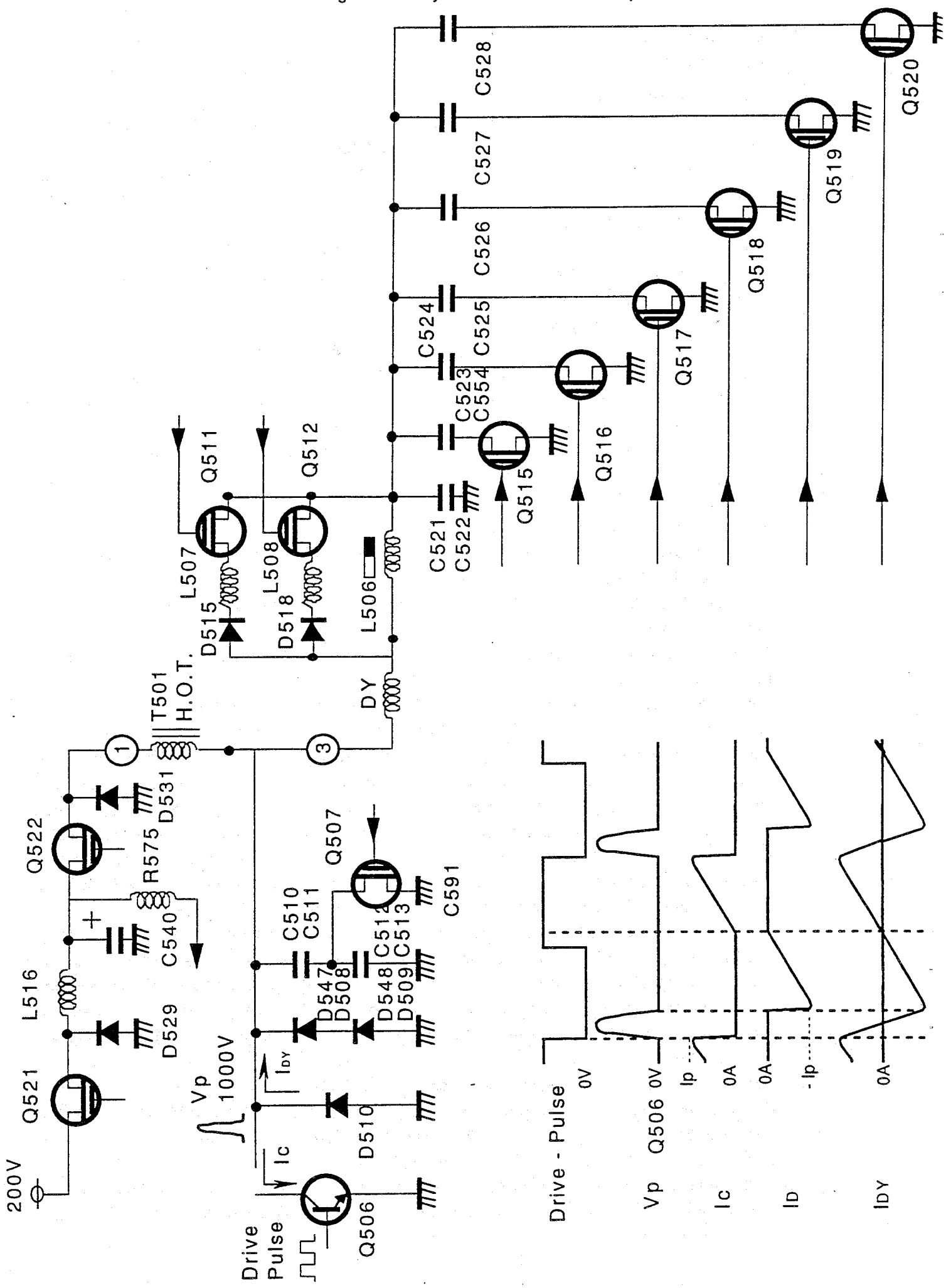
(3) The horizontal screen width is controlled by Q521, Q529, L516, C540 that configure the DC-DC converter and IC701 and IC708. The DC voltage of C540 that is the power supply for the horizontal deflection circuit passes through R575, etc., and is fed back to IC701 PIN-(16) on the control PCB. Composition of the feedback voltage and horizontal screen width control voltage PIN-(11) (output from PIN-(30) of IC708) is not done inside IC701. The rectangular wave applied to the DC-DC con vertor control IC in the IC701, and controlled to be the same voltage as the reference voltage is output from PIN-(17). The Q521 gate is driven by this output to maintain a stable horizontal screen width. By controlling the horizontal screen width variation through CPU control of the IC708 PIN-(39) voltage, the DC voltage of C540 will change, and the horizontal screen width will change.

(4) The side PCC circuit is controlled by Q522, D531, IC701 and IC708 as the chopper of the DC voltage stabilized at both ends of C540. Each signal of the parabola wave, sawtooth wave and free wave (random wave) applied on PIN-(12) of IC701 from PIN-(31) of IC708 is compared with the sawtooth blade synchronized with the horizontal synchronization created in IC801, and is then converted into a rectangular wave PWM signal. The side PCC control can drive the Q522 gate from PIN-(18) of IC701 by this PWM.

(5) Horizontal position adjustment (left/right balance adjustment)
The horizontal position and left/right composite signal configured by IC503, Q550, IC502 and IC708 and applied to IC502 from PIN-(28) of IC708 controls PIN-(2) of the IC503, and supplies a DC voltage or a vertically synchronized PIN, KEY or free dynamic current.

(6) Q511 and Q512 change the horizontal linearity compensation coil, and L507 and L508 turn ON in parallel with the horizontal linearity compensation coil L506 to compensate the horizontal linearity with the horizontal frequency.

Fig. 2.3 Theory-of horizontal deflection operation



2.2.2 High-voltage circuit

(1) The same drive pulse as the horizontal deflection is input in PN-(1) of IC500, and Q604 is switched with the horizontal cycle. Energy is supplied to the high-voltage coil when Q604 turns ON, and generates a high-voltage.
To keep the high-voltage constant regardless of the horizontal frequency or beam current amount, the voltage applied on PIN-(9) of the fly-back transformer T601 is changed.
The high-voltage is divided into approx. 1/300 by the breeder resistor in T601 and is detected. It is then applied onto PIN-(8) of IC600 and compared with the reference voltage in the IC.
The step-down transformer configured of Q605, L600 and D609 are driven by the output from PIN-(3) of IC601, and the voltage applied on PIN-(9) of T601 is fluctuated so that these two voltages become the same potential.
In the manner, feedback control is executed so that the high-voltage is always constant.
The high-voltage is set by VR600 (HV-ADJ). (27.0KV standard)

(2) If the high-voltage exceeds 30KV, the voltage detected by the resistance of the focus back in T601 passes through R646, Q608, VR601 and R647, is applied on D613 and turns Q956 ON. The same operation as power management is entered and the high-voltage circuit is shut down.
This state is not released until the power switch is turned OFF.

(3) The beam current flowed to T601 is detected at R654, input into PIN-(10) of IC600, and then com pared with the standard voltage of the IC. If the beam current exceeds approx. 1300EA, the D612 cathode is set to 12V, Q956 turns ON, the same operation as power management is entered and the high-voltage circuit is shut down.
This state is not released until the power switch is turned OFF.

2.2.3 Vertical deflection circuit

(1) The vertical deflection is an HIC IC400 configured of a DC coupled SEPP circuit using the +/- power supply. The drive system is almost all converged in IC400. Using the IC111 output sawtooth wave as a basic wave, the vertical linearity compensation wave, sine wave, and vertical position adjustment DC voltage are applied to PIN-(4) of the same IV from PIN-(45) of HIC-708, to by that optimally control the vertical size, linearity and vertical position.

2.2.4 DBF circuit

The DBF circuit is used to optimize the circuit at the center and periphery of the screen.
There are two focus electrodes, and a divided anode voltage is applied on both electrodes. The horizontal (approx. 350V) and vertical (approx. 150V) parabola waves are overlaid on the dynamic (F1) via the capacitor.
The horizontal and vertical parabola waves are created by IC102, and after being amplified by Q810, Q811, Q812 and Q813, are applied on the fly-back transformer T601.

2.2.5 Horizontal static convergence circuit

The horizontal static convergence circuit is a circuit where the mis-convergence at the side of the X-axis is compensated. The adjustment is done by flowing a DC current to the coil wound on the DY neck side.
R and B function symmetrically to the left and right in regard to G.
The plus or minus DC current is flowed to the H-STATIC coil from PIN-(3) of IC708.

2.2.6 Rotation circuit

The rotation circuit is a circuit that compensates the inclination of the screen caused by earth magnetism.
The adjustment is done by flowing a DC current to the coil wound on the front side of DY.
The plus or minus DC current is flowed to the rotation coil from PIN-1 of IC708.

2.3 Control block

Fig. shows the block diagram of the control PCB configured of the analog control section block and digital control section block.

2.3.1 Digital control section

This section is configured of a 16-bit CPU (IC101), distortion compensation waveform generator G/A (IC102), synchronous separated G/A (IC103), non-volatile memory (IC105), RS-232-C driver/receiver IC (IC107), surge protector (IC109, not illustrated), IC110 (power voltage monitor IC, not illustrated) and DDC memory (IC113), etc.

(1) Adjustment, timing judgment and automatic sizing operation

Information input to the CPU (IC101) includes the brightness, contrast, screen size and position key input information from the front panel switches that is passed and transferred via the distortion compensation waveform generator G/A (IC102). This information also includes the horizontal/vertical synchronization signal and synchronization signal polarity that is passed and transferred via the synchronous separated G/A (IC103). The horizontal and vertical synchronization signal frequencies are measured by counting the 256-divided pulse of the horizontal synchronization signal and the cycle of the vertical synchronization signal (both created by IC102) with the timer built into the CPU. The data such as the screen size and position preregistered in IC105 based on the synchronization signal frequency and polarity is read out to the built-in RAM by IC101. This information is output to the distortion compensation waveform generator G/A shown in the block diagram or the waveform control HIC (IC708) described later.

(2) Automatic tracking operation

Horizontal automatic tracking operation:

The block diagram of the horizontal oscillation frequency control circuit (in IC708) is shown in Fig..

The data proportional to the horizontal synchronization signal frequency input in IC101 is output to the D/A convertor IC in IC708 as H-OSC-MAIN. The linear interpolation is calculated based on the frequency fine adjustment data (five points: HOSCLOW, HOSCM1, HOSCM2, HOSCH1, HOSCH2) registered in IC105 at factory adjustment. This is output to the D/A convertor IC in IC708 as H-OSC-SUB. The above H-OSC-MAIN and H-OSC-SUB are added, and output to IC700 (horizontal oscillation control IC) as the horizontal oscillation control voltage. The capacity of the horizontal oscillation capacitor in IC700 is changed according to the range of the horizontal frequency near 86kHz by the IC101 OSC-C signal. At the same time, the operation voltage offset of the horizontal oscillation frequency control circuit in IC708 is changed over.

Horizontal +B voltage control operation:

Following the input horizontal synchronization signal frequency, IC101 calculates the linear interpolation based on the adjustment data per frequency data (four points: +BLOW, +BM1, +BM2, +BH1) registered in IC105 at factory adjustment. This is output to the D/A convertor IC in IC708 as the +B control voltage. The horizontal screen size control voltage output from a separate channel of the D/A convertor IC in IC708 and the +B control voltage are added, and output as the horizontal width/+B control voltage to the horizontal/+B chopper control circuit IC701.

Horizontal output transistor drive condition control operation:

Following the input horizontal synchronization signal frequency and horizontal screen width adjustment data, IC101 calculates the linear interpolation based on the adjustment data per horizontal screen width/frequency (eight points: H-DRIVE-N-LOW, H-DRIVE-N-M1, H-DRIVE-N-ME, H-DRIVE-N-HI, H-DRIVE-W-LOW, H-DRIVE-W-M1, H-DRIVE-W-M2, H-DRIVE-W-HI) registered in IC105 at factory shipment. This is output to the D/A converter IC in IC708, and is then output to the horizontal/+B chopper control circuit IC701 as the horizontal output transistor drive control voltage.

Vertical automatic tracking operation:

The vertical synchronization signal VSYNC is phase controlled by the synchronous separated G/A, and is supplied to the vertical deflection control circuit (IC707) in PWB-CONT-SUB as the VSPHASE signal. IC707 executes forced lead-in with the VSPHASE signal, by that executing the automatic tracking operation of the vertical oscillation frequency.

(3) Distortion compensation operation

The compensation waveform for distortion compensation is realized by a combination of the IC102 digital waveform generation function and IC707 analog waveform generation function. The usage of digital and analog is as follows.

Horizontal deflection distortion compensation

To compensate the horizontal deflection distortion, the compensation using IC102 and IC707 shown below and the CS changeover using IC101 is executed.

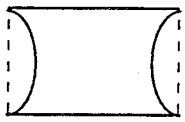
(1) S-PCC compensation process (The following waveforms are mixed in IC708.)

Digital waveform generation (A synthetic waveform is output from IC102 VDAOUT3.)

a. PCC-SIN

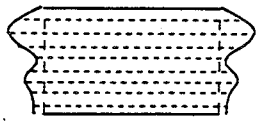
Sine wave compensation amplitude
It is possible to adjust with only communication.

b. PCC-CORNER



Corner parabola wave compensation amplitude

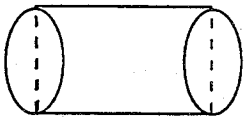
c. PCC-FREE



Left/right symmetrical random waveform
(Sampling point: 32 points)

Analog waveform generation (IC707)

d. PCC-AMP



Squared parabola wave compensation amplitude

e. PCC-PHASE

Trapezoidal distortion compensation phase

(2) PIN/KEY balance compensation process (The following waveforms are mixed in IC708.)

Digital waveform generation (A synthetic waveform is output from IC102 VDAOUT4.)

f. PIN balance

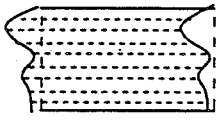
Squared parabola wave balance compensation

g. SIN balance

Sine wave balance compensation

It is possible to adjust with only communication.

h. balance free



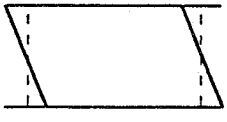
Left/right asymmetrical random waveform
(Sampling point: 32 points)

i. PCC-CORNER balance

Corner compensation balance

Analog waveform generation (IC707)

j. KEY balance



Parallel square distortion compensation

3) CS changeover

The six channels CS1 to CS6 are used for the CS changeover. As shown below, the changeover pattern is set per 2kHz.

Table CS changeover pattern

Horizontal frequency(KHz)	CS6	CS5	CS4	CS3	CS2	CS1	LIN1	LIN2	DATA(H)
30-32	0	0	0	0	0	0	1	1	03
32-34	0	0	0	1	0	0	1	0	12
34-36	0	1	1	1	0	0	1	0	72
36-38	1	0	1	0	1	0	1	0	aa
38-40	0	0	0	1	1	0	1	0	1a
40-42	1	0	0	0	0	1	1	1	87
42-44	0	0	1	0	0	1	1	0	26
44-46	1	1	1	0	0	1	1	0	e6
46-48	0	1	0	1	0	1	1	0	56
48-50	1	0	1	1	0	1	0	1	b5
50-52	0	0	0	0	1	1	1	0	0e
52-54	0	0	0	0	1	1	0	1	0d
54-56	1	0	0	0	1	1	0	1	8d
56-58	1	0	0	0	1	1	0	1	8d
58-60	0	1	0	0	1	1	1	0	4e
60-62	0	1	0	0	1	1	1	0	4e
62-64	1	1	0	0	1	1	1	0	ce
64-66	0	0	1	0	1	1	1	0	2e
66-68	1	0	1	0	1	1	1	0	ae
68-70	0	1	1	0	1	1	1	0	6e
70-72	0	0	0	1	1	1	1	0	1e
72-74	0	1	0	1	1	1	1	0	5e
74-76	1	1	0	1	1	1	1	0	de
76-78	0	0	1	1	1	1	1	0	3e
78-80	0	0	1	1	1	1	1	0	3e
80-82	0	0	1	1	1	1	0	0	3c
82-84	1	0	1	1	1	1	0	0	bc
84-86	1	0	1	1	1	1	0	0	bc
86-88	0	1	1	1	1	1	0	0	7c
88-90	0	1	1	1	1	1	0	0	7c
90-92	0	1	1	1	1	1	0	0	7c
92-94	1	1	1	1	1	1	0	0	fc

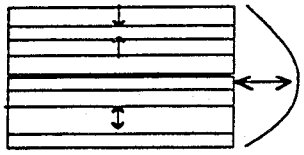
* When CS or LIN-COIL is ON, the corresponding bit is set to "0"
* When OFF, the corresponding bit is set to "1".

Vertical deflection distortion compensation

To compensate the vertical deflection distortion, the following compensation is executed by IC102.

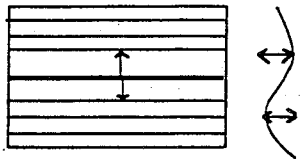
1) Digital waveform generation (The following synthetic waveform is output from VDAOUT2)

a. V-LIN-PARABOLA



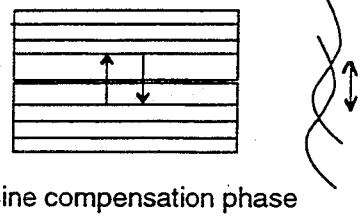
Squared parabola compensation amplitude

b. V-LIN-SINE-AMP



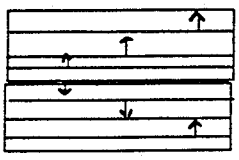
Sine compensation amplitude

c. V-LIN-SINE-PHASE



Sine compensation phase

d. V-LIN-FREE



Vertical linearity random waveform compensation
(Sampling point: 32 points)

(4) Automatic calibration operation

The automatic calibration is started by IC101 under the following conditions.

1) When AUTOCAL switch on front panel is pressed.
2) When new timing not registered in IC105 is input.

After automatic calibration is started, the automatic calibration ON/OFF output (ASEL) supplied to PCB-VIDEO is set to "L" for a set time (approx. 2 sec.). The timing detection circuit for automatic calibration on PCB-VIDEO operates, the rising/falling edges of the image signal are detected, and a pulse is output (Note 1). The timing pulse of the image input signal detected by PCB-VIDEO is supplied to the control circuit as the timing detection signal (VIDEO) for automatic calibration. The time of the same signal is measured in the synchronous separated G/A (IC103), and the results are serially transferred to IC101. At the same time, the phase difference of the horizontal fly back pulse and horizontal synchronization signal output is measured by IC103. Based on the measurement results of the above image signal timing and the counting results of the horizontal/vertical synchronization signal frequency, the IC101 refers to data preset before factory shipment, and creates new screen adjustment data (Note 2).

Note 1 : The conditions for the detection circuit for automatic calibration to effectively operate are as follow. The outer frame section is displayed on the screen, and the dot clock of the outer frame's vertical line is 70MHz or less.

Note 2 : The data preset before factory shipment includes data that cannot be set (horizontal and vertical active display time data) even when adjusted with the factory mode in the field. Thus, when adjusting the factory mode in the field, the automatic calibration accuracy may deteriorate.

(5) RS-232-C communication process operation

Communication is executed with the RS-232-C interface built into IC101. The operation conditions for communication are as follow.

Speed:	9600BPS
Data length:	8-bit
Parity:	None
Stop bit:	1-bit

Refer to the communication function specifications for details on the communication commands, etc.

(6) DDC circuit

The DDC (Display Data Channel) functions are all realized by IC113.

IC113 is a non-volatile memory exclusive for the 1kbit DDC, and supports DDC1 and DDC2B (note, only the EDID file).

The following data is registered as the DDC memory (EDID= Extended Display Identification).

The data is written with and exclusive programmer from the DSUB15P connector.

Table Details of EDID file for OWN BRAND

00 FF FF FF FF FF FF 00 34 AC 40 00 FF FF FF FF W Y 01 00 0E 26 1C 69 E8 04 88 A0 57 4A 9B 26 12 48 4C 20 07 80 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 38 4A 40 C0 61 B0 28 40 20 C0 33 00 7C 1D 11 00 00 18 C8 32 00 A0 51 00 27 40 40 A0 33 00 7C 1D 11 00 00 18 F0 6B 80 A0 20 90 31 10 10 60 C2 00 7C 1D 11 00 00 1C BC 34 00 98 51 00 2A 40 10 90 13 00 7C 1D 11 00 00 1E 00 S	Where in the data on the left W : Manufacturing week Y : Manufacturing year S : Check sum

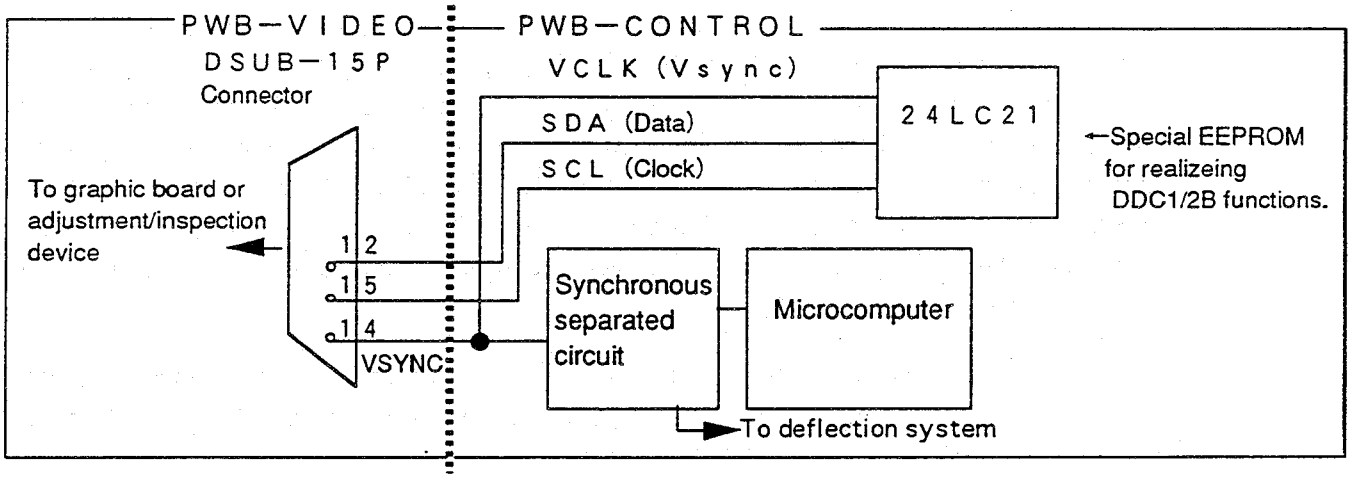


Fig. DDC circuit configuration drawing

(7) Power save function

(7-1) Setting of power save function

The following setting can be made from the OSD screen for the power save function.

a. ON/OFF of power save function

(7-2) Outline of power save function

This function has the following two modes.

a. SUSPEND mode:
   The secondary power excluding the heater and +5V power is turned OFF.
   The image is displayed immediately with the operation for restoration to the normal usage state.
b. COMPLETE OFF mode:
   All secondary power including the heater and excluding the +5V power is turned OFF.
   The image will display several seconds after the operation for restoration to the normal usage state.

(7-3) Explanation of SUSPEND mode operation details

Conditions to enter this mode:

a. This mode is entered when H-SYNC is correctly input, and the state where the V-SYNC frequency has been at 10Hz or less for the delay time that is preset.
b. This mode is entered when the SUSPEND command is received with the RS-232-C command. In this case, the monitor side delay time setting will be invalid.

Display indicating operation:

1) In the case of a. above, after a five-second wait time, the operation state will display on the OSD screen for two seconds before the operation starts. After the operation has started, the display will be made by the flickering (two second interval) of the power LED.
2) In the case of b. above, a display is not made on the OSD before the operation is started. After the operation has started, the display will be made by the flickering (two second interval) of the power LED as in item 1) above.

Signal output to power circuit

The SUSPEND signal output is changed from "H" to "L". (ACTIVE LOW)

Cancellation of operation

1) In the case of a. above, the operation is restored when H-SYNC and V- SYNC are correctly input.
2) In the case of b. above, the operation is restored when the POWER ON command is received.
3) In both cases a, , and b. above, the state to the OSD screen display can be started by operating the buttons on the front panel. However, in this case, only the setting of the power save function will be possible.

The SUSPEND signal output will return from "L" to "H".

(7-4) Explanation of COMPLETE OFF mode operation details

Conditions to enter this mode:

a. This mode is entered when the state where the H-SYNC and V-SYNC frequency has been at 10kHz and 10Hz or less respectively for the delay time that is preset.
b. This mode is entered when the COMPLETE OFF command is received with the RS-232-C command.

Display indicating operation:

1) In the case of a. above, after a five-second wait time, the operation state will display on the OSD screen for two seconds before the operation starts. After the operation has started, the display will be made by the flickering (two second interval) of the power LED.
2) In the case of b. above, a display is not made on the OSD before the operation is started.

Signal output to power circuit during operation :

The COMPLETE OFF signal output is changed from "H" to "L". (ACTIVE LOW)
The P-ECO signal output is changed from "H" to "L". (ACTIVE LOW)

Cancellation of operation :

1) In the case of a. above, the operation is restored when H-SYNC and V-SYNC are correctly input.
2) In the case of b. above, the operation is restored when the POWER ON command is received.
3) In both cases a. , and b. above, the state to the OSD screen display can be started by operating the buttons on the front panel. However, in this case, only the setting of the power save function will be possible.

Signal output to power circuit during restoration :

First, the P-ECO signal output is changed from "L" to "H", and the data is set to DAC.
Next, the COMPLETE OFF signal output will return from "L" to "H".

(7-5) Priority and status transition of power save mode

1) Priority of power save mode
   If the H, VSYNC input states change during the power save operation, the priority will be as follows due to each input selection of BNC/DSUB.

2) Change of power save mode state

Name	HV		Priority
Normal operation (power ON)	○	○	1 (Hight)
STAND-BY	×	○	2
SUSPEND	○	×	3
COMPLETE-OFF	×	×	4 (Low)

a. If the input state changes, the power save mode will be changed.
b. If the BNC/DSUB inputs differ, the operation will be executed with the side having an input with a high priority shown above.

Example: BNC side → SUSPEND The SUSPEND operation is executed.
DSUB side → COMPLETE-OFF

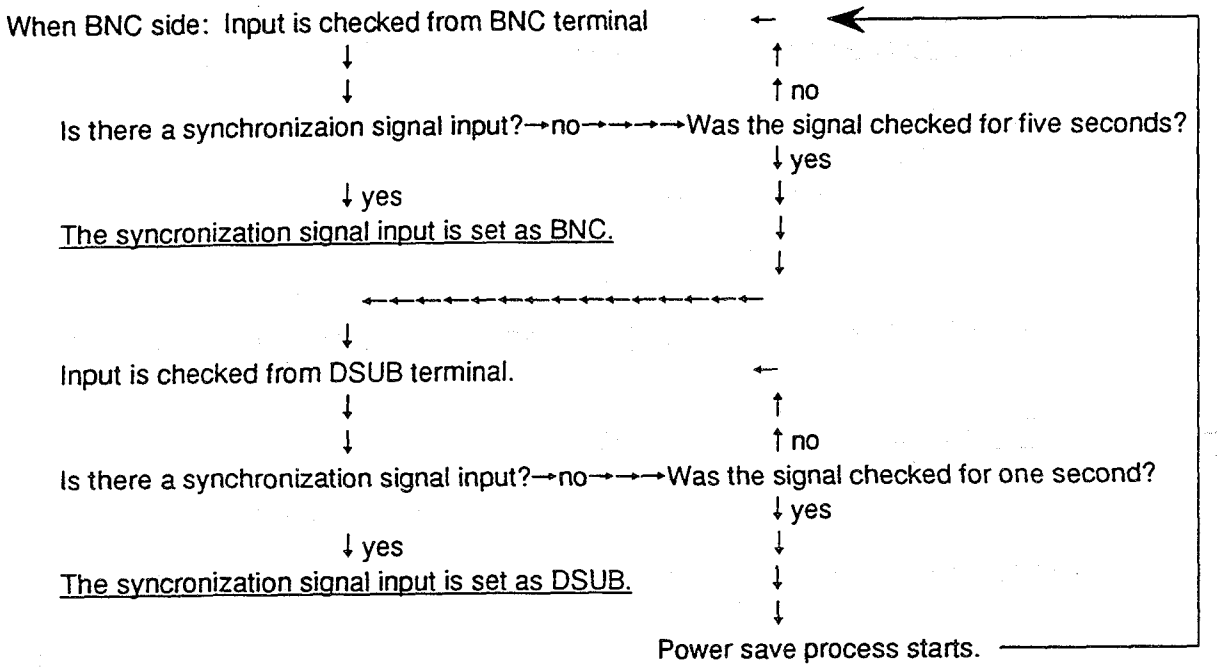
(8) Input connector automatic changeover function specifications

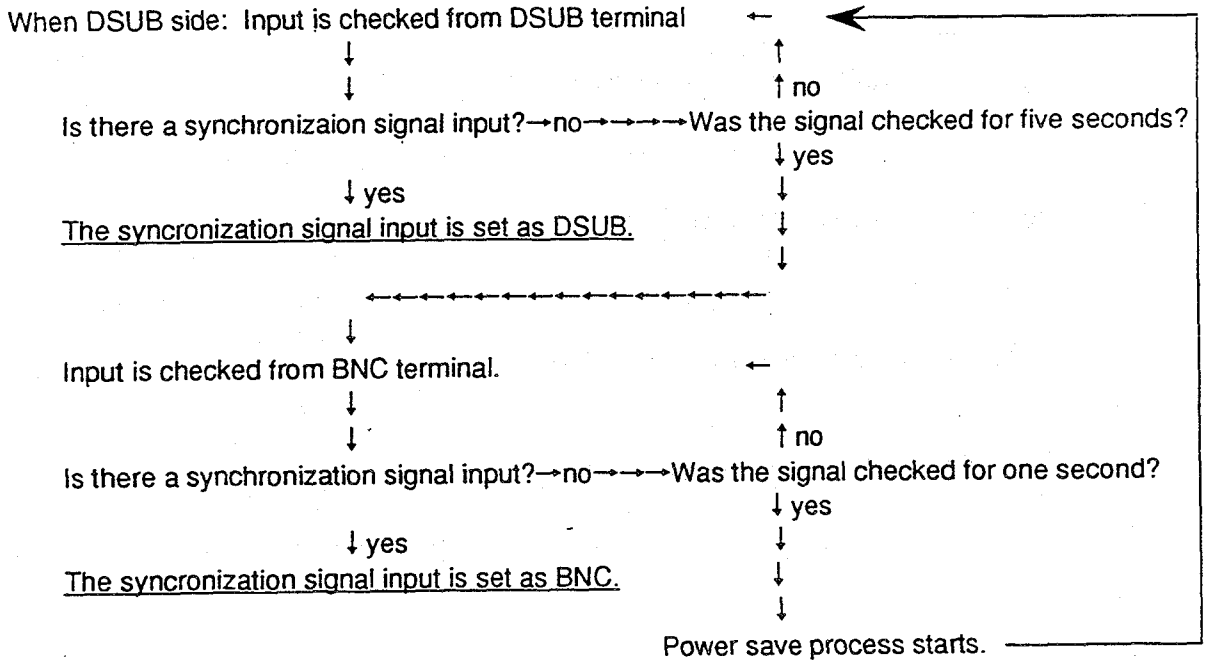
(8-1) Function

The N chassis has both the BNC/DSUB input systems that can be used by changing over. The changeover function operates as shown below.

1) During power ON

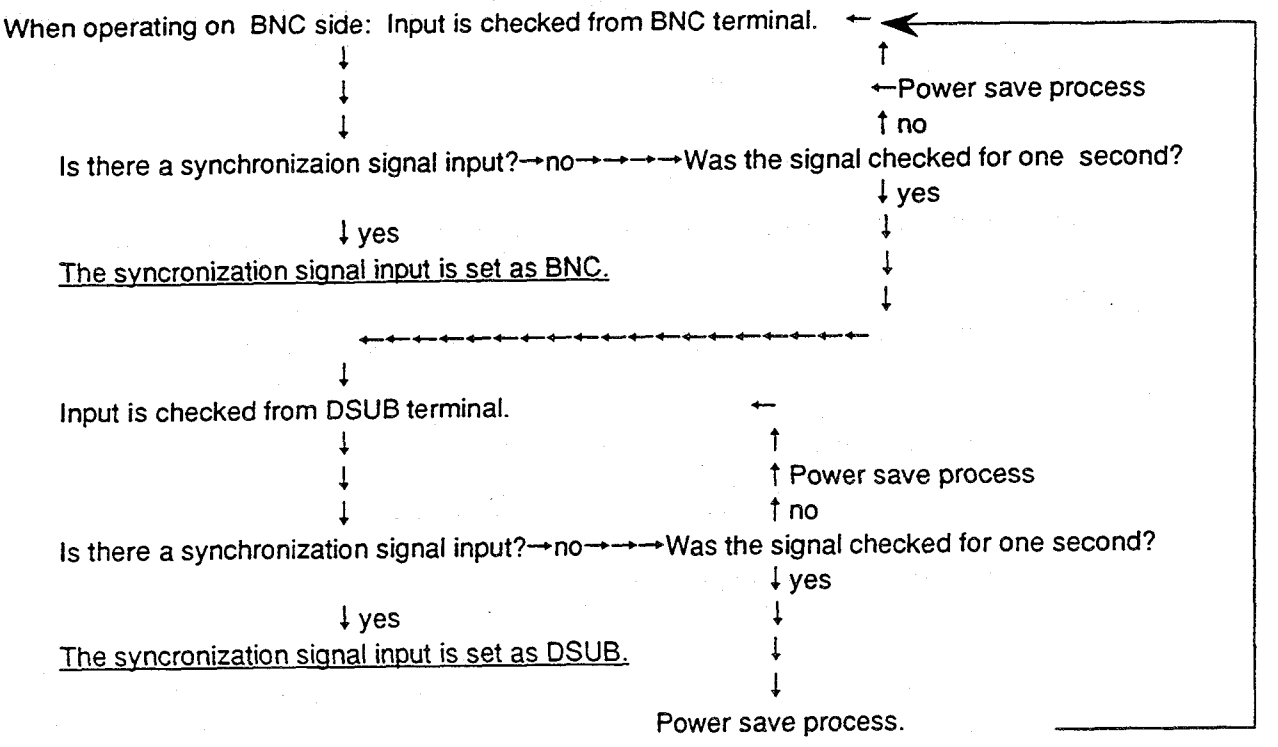
The synchronization signal input of each terminal is alternately checked in order according to the details set in the adjustment item "CONNECTOR". The function will operate on the terminal side where an input was confirmed.

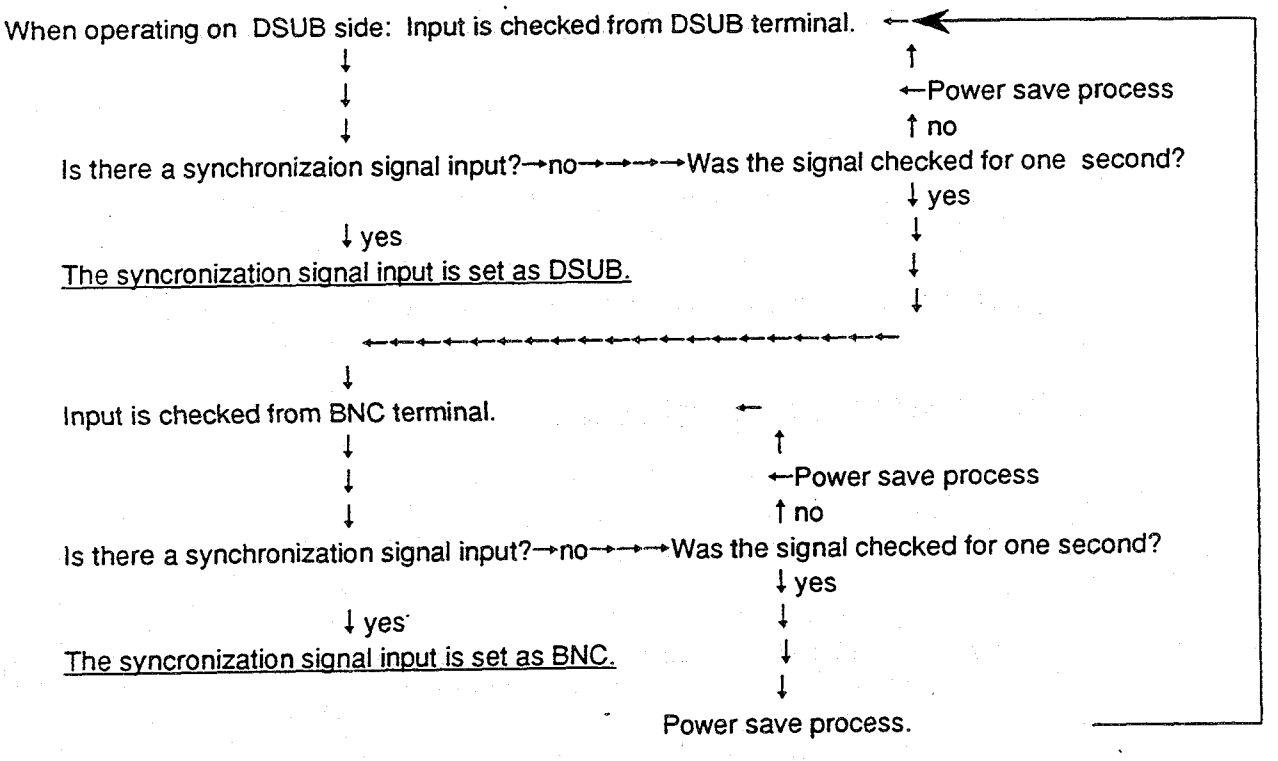

When BNC side: Input is checked from BNC terminal
Is there a synchronizaion signal input?
no
Was the signal checked for five seconds?
yes
yes
The syncronization signal input is set as BNC.
Input is checked from DSUB terminal.
Is there a synchronization signal input?
no
Was the signal checked for one second?
yes
yes
The syncronization signal input is set as DSUB.
Power save process starts.


When DSUB side: Input is checked from DSUB terminal
Is there a synchronizaion signal input?
no
Was the signal checked for five seconds?
yes
yes
The syncronization signal input is set as DSUB.
Input is checked from BNC terminal.
Is there a synchronization signal input?
no
Was the signal checked for one second?
yes
yes
The syncronization signal input is set as BNC.
Power save process starts.

2) During signal changeover

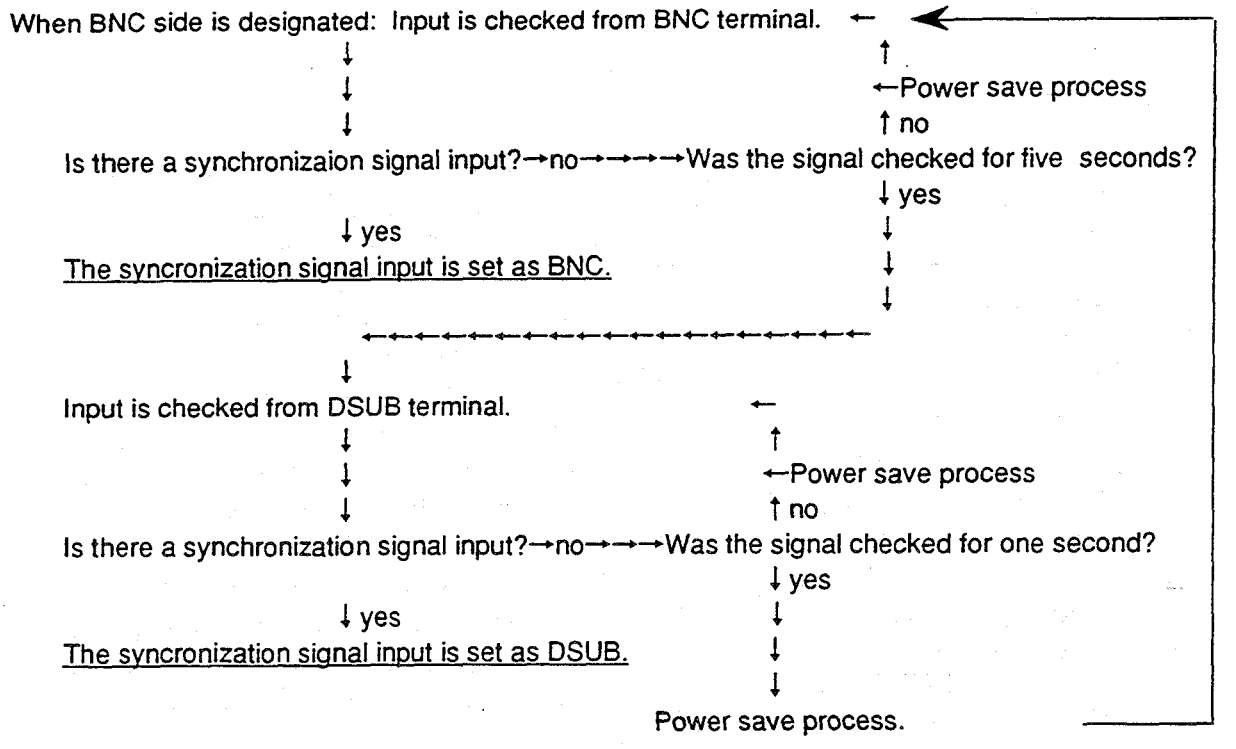
The synchronization signal input of each terminal is alternately checked from the terminal input before the signal off. The function will operate on the terminal side where an input was confirmed.

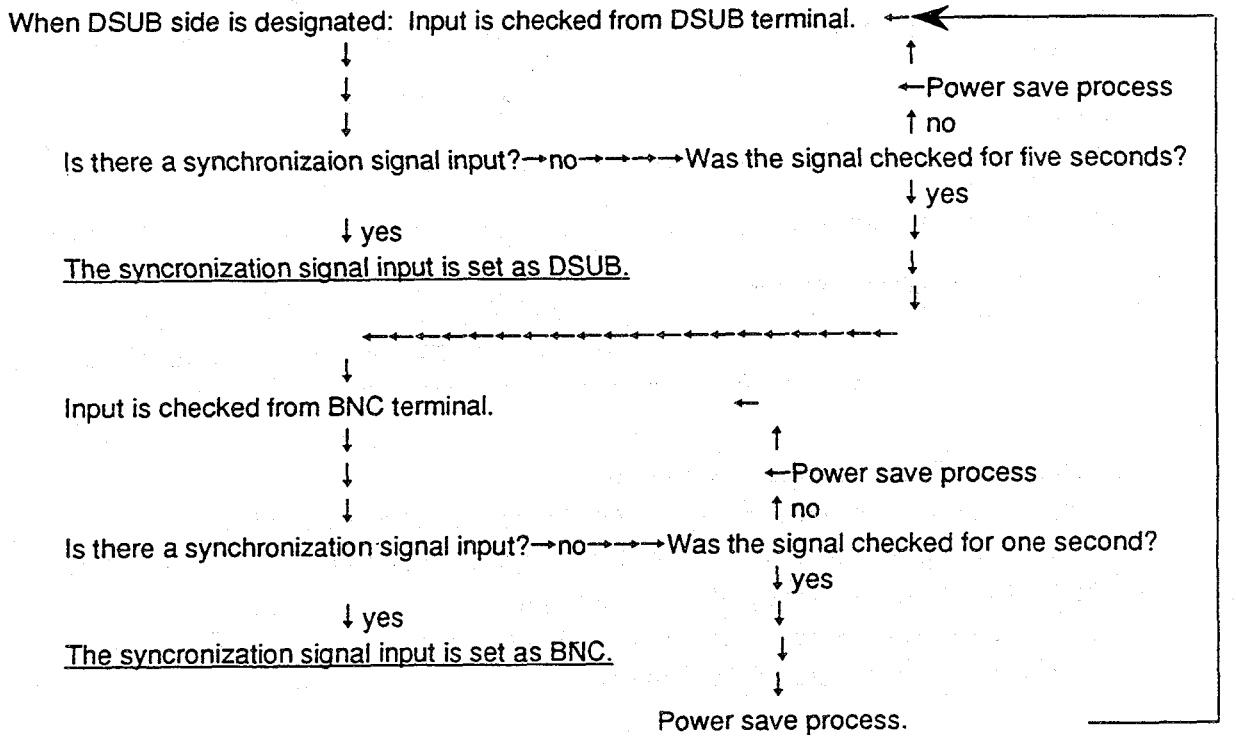

When operating on BNC side: Input is checked from BNC terminal.
←Power save process
no
Is there a synchronizaion signal input?→no→→→→Was the signal checked for one second?
yes
yes
The syncronization signal input is set as BNC.
Input is checked from DSUB terminal.
Power save process
no
Is there a synchronization signal input?→no→→→Was the signal checked for one second?
yes
yes
The syncronization signal input is set as DSUB.
Power save process.


When operating on DSUB side: Input is checked from DSUB terminal.
←Power save process
no
Is there a synchronizaion signal input?→no→→→→Was the signal checked for one second?
yes
yes
The syncronization signal input is set as DSUB.
Input is checked from BNC terminal.
←Power save process
no
Is there a synchronization signal input?→no→→→Was the signal checked for one second?
yes
yes
The syncronization signal input is set as BNC.
Power save process.

3) During change over of CONNECTOR setting in normal mode

The synchronization signal input of each terminal is alternately checked from the terminal designated with the CONNECTOR setting. The function will operate on the terminal side where an input was confirmed.


When BNC side is designated: Input is checked from BNC terminal.
←Power save process
no
Is there a synchronizaion signal input?→no→→→→Was the signal checked for five seconds?
yes
yes
The syncronization signal input is set as BNC.
Input is checked from DSUB terminal.
←Power save process
no
Is there a synchronization signal input?→no→→→Was the signal checked for one second?
yes
yes
The syncronization signal input is set as DSUB.
Power save process.


When DSUB side is designated: Input is checked from DSUB terminal.
←Power save process
no
Is there a synchronizaion signal input?→no→→→→Was the signal checked for five seconds?
yes
yes
The syncronization signal input is set as DSUB.
Input is checked from BNC terminal.
←Power save process
no
Is there a synchronization signal input?→no→→→Was the signal checked for one second?
yes
yes
The syncronization signal input is set as BNC.
Power save process.

2.3.2 Analog control section

This section is configured of the compensation waveform control HIC (IC708), horizontal oscillation control IC (IC700), horizontal/+B chopper control HIC (IC701), vertical deflection control circuit (PWB-CONT-SUB, IC707), 5V terminal regulator (IC710), surge protector (IC709, not illustrated), etc.

(1) Function of compensation waveform control HIC

As explained earlier, the compensation waveform control HIC (IC708) is an HIC that executes the mixing of each control voltage and the amplitude control. The input/output functions are as shown below.

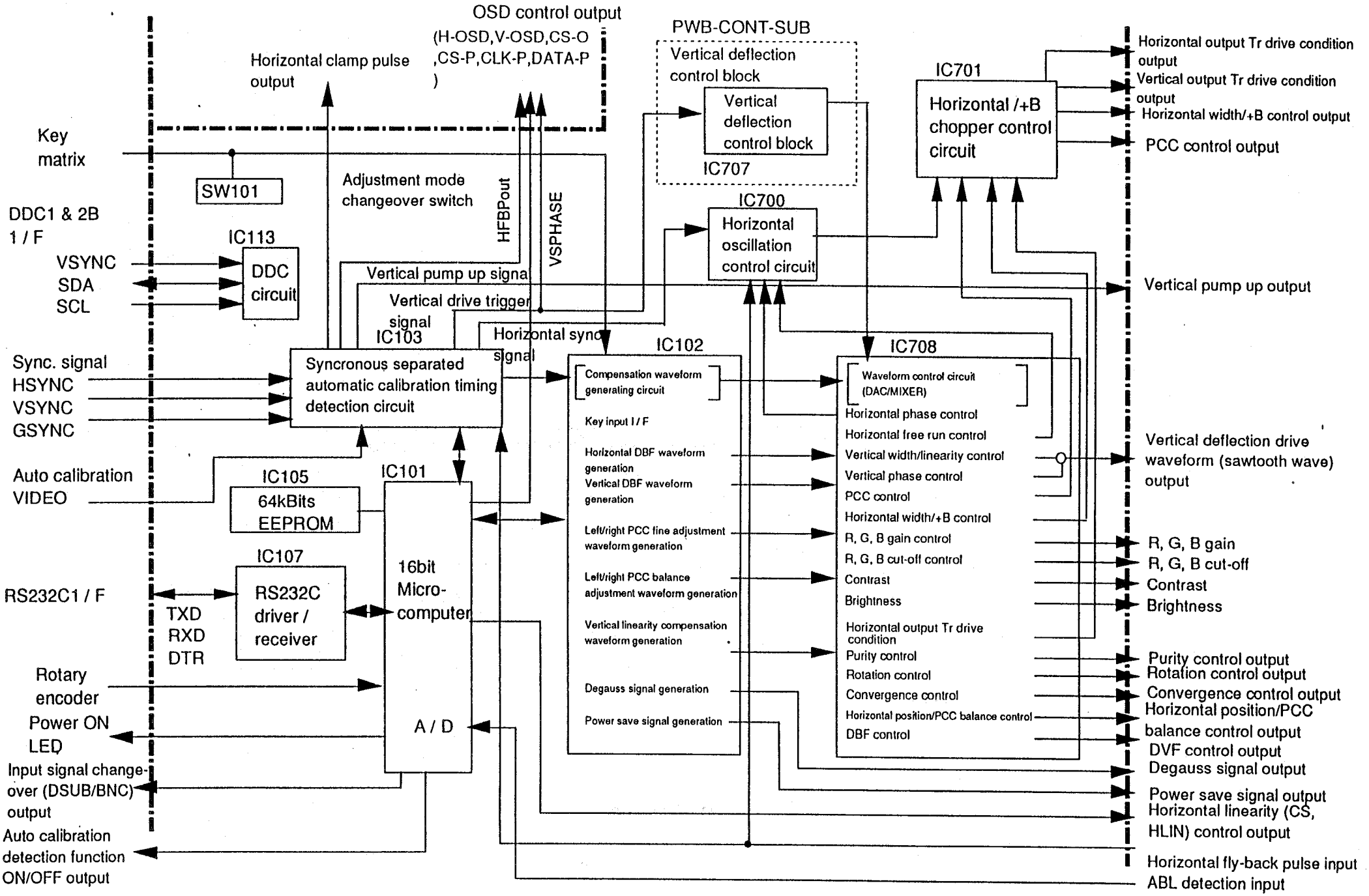
Table IC708 function

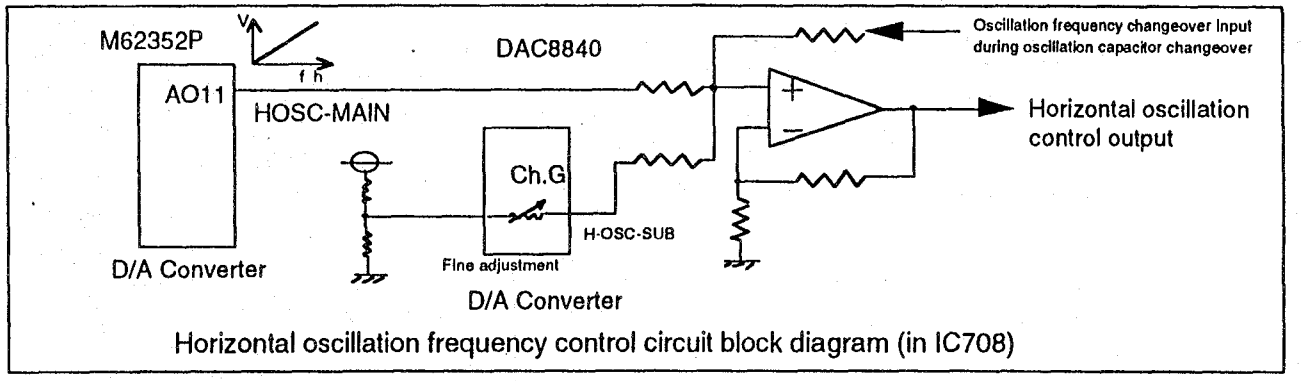
Input	Pin No.	Output	Pin No.
+5V power	39	R-GAIN control voltage output	9
-5V power	40	G-GAIN control voltage output	8
+12V power	42	B-GAIN control voltage output	7
- 12V power	43	R-BIAS control voltage output	6
GND	38,41,37,36	G-BIAS control voltage output	5
Serial data input (DI)	20	B-BIAS control voltage output	4
Serial clock input (CLK)	21	Contract control voltage output	10
Load pulse input No.1 (LD0)	22	Brightness control voltage output	44
Load pulse input No.2 (LD1)	23	Serial data output (DO)	25
Load pulse input No.3 (LD2)	24	Horizontal output Tr drive control voltage output	34
HDBF waveform input	11	Horizontal oscillation duty control voltage output	32
VDBF waveform input	13	H/V-DBF compensation waveform output	33
Vertical linearity compensation waveform input	14	PCC compensation waveform output	31
Vertical sawtooth wave input	16	Rotation control voltage output	1
PCC digital compensation waveform input	15	H-STATIC convergence control voltage output	3
PCC analog compensation waveform input	17	Purity control voltage output	2
PCC balance compensation waveform input	12	+B control voltage output	30
Moire cancel waveform input	19	PCC balance compensation waveform/horizontal position control voltage output	28
Horizontal Oscillation capacitor changeover signal input	35	Moire cancel waveform output Vertical deflection sawtooth wave output Horizontal oscillation frequency control voltage output	29 45 27

(2) Horizontal/+B chopper control HIC (IC701)

The horizontal/+B chopper control HIC (IC701) has the following functions.

a. Switching pulse output for horizontal output transistor drive condition control
b. Horizontal output transistor drive pulse output
c. Switching pulse output for horizontal width/+B control
d. Switching pulse output for PCC control


OSD control output
(H-OSD,V-OSD,CS-O
,CS-P,CLK-P,DATA-P
)
Horizontal clamp pulse output
PWB-CONT-SUB
Vertical deflection control block
Vertical deflection control block
IC707
IC701
Horizontal /+B chopper control circuit
Horizontal output Tr drive condition output
Vertical output Tr drive condition output
Horizontal width/+B control output
PCC control output
Key matrix
SW101
Adjustment mode changeover switch
HFBPout
VSPHASE
IC700
Horizontal oscillation control circuit
DDC1 & 2B 1 / F
VSYNC
SDA
SCL
IC113
DDC circuit
Vertical pump up signa
Vertical drive trigger signal
Vertical pump up output
IC103
Horizontal sync signal
IC102
IC708
Sync. signal
HSYNC
VSYNC
GSYNC
Syncronous separated automatic calibration timing detection circuit
Compensation waveform generating circuit
Waveform control circuit (DAC/MIXER)
Key input I / F
Horizontal phase control
Horizontal free run control
Horizontal DBF waveform generation
Vertical DBF waveform generation
Vertical width/linearity control
Vertical phase control
PCC control
Horizontal width/+B control
Vertical deflection drive waveform (sawtooth wave) output
Auto calibration VIDEO
IC105
64kBits EEPROM
IC101
Left/right PCC fine adjustment waveform generation
R, G, B gain control
R, G, B cut-off control
R, G, B gain
R, G, B cut-off
IC107
Left/right PCC balance adjustment waveform generation
Contrast
Brightness
RS232C1 / F
TXD
RXD
DTR
RS232C driver / receiver
16bit Micro-computer
Vertical linearity compensation waveform generation
Horizontal output Tr drive condition
Purity control
Purity control output
Rotation control output
Rotary encoder
Degauss signal generation
Rotation control
Convergence control output
Power ON LED
Power save signal generation
Convergence control
Horizontal position/PCC balance control output
Horizontal position/PCC balance control
A / D
DBF control
DVF control output
Input signal change-over (DSUB/BNC) output
Degauss signal output
Power save signal output
Horizontal linearity (CS, HLIN) control output
Auto calibration detection function ON/OFF output
Horizontal fly-back pulse input
ABL detection input



Horizontal oscillation frequency control circuit block diagram (in IC708)

2.3.3 Control function

(1) Max. No. of registrable timings

Factory setting shipment timing:	16 timings
User timing:	12 timings
Total:	28 timings

(2) Judgment standards for input signal changes

The change of the input signal will be judged when one of the following conditions is established.

a. When the polarity of the horizontal of vertical synchronization signal changes.
b. When the horizontal synchronization signal frequency changes 0.5kHz or more.
c. When the vertical synchronization signal frequency changes 0.5kHz or more.

(3) Judgment standards for input signal

When the input signal and frequency data registered in the EEPROM are compared and all of the following conditions are established, it will be judged that the input signal is the same as the registered signal.

a. Both horizontal and vertical synchronization signal polarities are the same.
b. The difference in the horizontal synchronization signal frequency is less than 0.5kHz.
c. The difference in the vertical synchronization signal frequency is less than 0.5kHz.

(4) Standards for new registration of input signal

If one of the following conditions is established between the input signal and all frequency data (directory) registered in the EEPROM, the frequency data of that input signal will be newly registered in the EEPROM. In this case, the division of the user and factory setting timings is as follows.

a. When adjustment mode is normal or enhanced mode
   The data will be registered in an open area of the user timing memory. If 12 user timings are already registered, the oldest data will be erased, and the new data overwritten.
b. When adjustment mode is factory mode
   The data will be registered in an open area of the factory setting memory. If 16 factory set timings are already registered, the oldest data in the user timing memory will be erased, and the new data overwritten.

(5) Display of input timing judgment results

In addition to the horizontal synchronization signal frequency and vertical synchronization signal frequency, the following types of registered Nos. will display on the OSD HELP screen.

a. When judged as factory set timing : PRESET 0 to 15
b. When judged as user timing: USER 0 to 11

(6) Fine adjustment function using front panel

If either the SELECT button or ADJUST button is operated, the OSD screen display will start, and the currently selected adjustment item will display. If there is no operation for ten seconds, the OSD display will be automatically erased. However, the selected adjustment item will be held until the power is turned OFF. If the ADJUST-VR is set to the rotary encoder side, the adjustment item after the OSD display is erased will automatically be reset to CONTRAST. The item is selected with the SELECT button, and the adjustment is made with the ADJUST button.

The following adjustment modes are available.

a. Normal mode
b. Enhanced mode
c. FACTORY 1 (Factory adjustment mode using front panel operation)
d. FACTORY 2 (Factory adjustment mode using SW101 on PWB-CONTROL)
e. RS-232-C communication function

The items that can be adjusted in each adjustment mode are as shown in Table.

(7) Recall function

If the RESET button on the front panel is pressed in the normal mode or enhanced mode, the data for items shown in Table can be returned to the factory shipment settings states after adjustment.

For the CONTRAST, BRIGHT, H-STATIC, ROTATION and PURITY items, the factory setting values can be set by pressing the ADJUST +/- buttons simultaneously. These factory setting values are updated when adjusted in the FACTORY mode.

(8) Adjustment data control method

As shown in Table, there is adjustment data that is registered according to timing, and adjustment data that is common between the timings.

Table Adjustment Items for data administration/recall operation/center click operation

Adjustment Items	Data administration		Recall operation	Center click operation
	By Timing	Common		
CONTRAST		○		○
BRIGHT		○		○
INPUT		○		○
H-SIZE	○		○	
H-PHASE	○		○	
V-SIZE	○		○	
V-PHASE	○		○	
PCC-AMP	○		○	
PCC-PHASE	○		○	
PIN-BALANCE	○		○	
KEY-BALANCE	○		○	
H-STATIC		○		○
ROTATION		○		○
COLOR No.	○		○by the color adjustment screen	
R_GAIN color1	○		○by the color adjustment screen	
G_GAIN color1	○		○by the color adjustment screen	
B_GAIN color1	○		○by the color adjustment screen	
R_GAIN color2	○		○by the color adjustment screen	
G_GAIN color2	○		○by the color adjustment screen	
B_GAIN color2	○		○by the color adjustment screen	
R_GAIN color3	○		○by the color adjustment screen	
G_GAIN color3	○		○by the color adjustment screen	
B_GAIN color3	○		○by the color adjustment screen	
POWER_SAVE		○		
MOIRE_CLEAR	○		○	
MOIRE_LEVEL	○		○	
ADJUST_VR		○		
H_POSI	○		○	
V_POSI	○		○	
V_LIN	○		○	
VLIN_BALANCE	○		○	
CENTER_PCC	○		○	
CORNER_PCC	○		○	
CENTER_BALANCE	○		○	
CORNER_BALANCE	○		○	
CLAMP_PULSE_POSI	○		○	
PURITY		○		○
VIDEO_LEVEL		○	○	
HLIN(CS)	○			
PCC_FREE	○			
BAL_FREE	○			
PCC-BALANCE	○			
VLIN_PHASE	○			
VLIN_FREE	○			
DBFH_AMP	○			
DBFH_FREE		○		
DBFH_PHASE	○			
DBFV_AMP	○			
DBFV_FREE		○		
R_BIAS color1		○		
G_BIAS color1		○		
B_BIAS color1		○		
R_BIAS color2		○		
G_BIAS color2		○		
B_BIAS color2		○		
R_BIAS color3		○		
G_BIAS color3		○		
B_BIAS color3		○		
HOSC-LOW-H1		○		
HDRIVE-N-LOW-H1		○		
+B-LOW-H1		○		
ABL-ADJUST		○		
BRIGHT-CENT/MAX		○		

Table Adjustment Items for adjustment modes

Adjustment Items	Adjustment mode				
	Normal	Enhanced	RS232C	Factory1	Factory2
CONTRAST	○		○	○	○
BRIGHT	○		○	○	○
INPUT	○		○	○	○
H-SIZE	○		○	○	○
H-PHASE	○		○	○	○
V-SIZE	○		○	○	○
V-PHASE	○		○	○	○
PCC-AMP	○		○	○	○
PCC-PHASE	○		○	○	○
PIN-BALANCE	○		○	○	○
KEY-BALANCE	○		○	○	○
H-STATIC	○		○	○	○
ROTATION	○		○	○	○
COLOR No.	○		○	○	○
R_GAIN color1	○		○	○	○
G_GAIN color1	○		○	○	○
B_GAIN color1	○		○	○	○
R_GAIN color2	○		○	○	○
G_GAIN color2	○		○	○	○
B_GAIN color2	○		○	○	○
R_GAIN color3	○		○	○	○
G_GAIN color3	○		○	○	○
B_GAIN color3	○		○	○	○
POWER_SAVE	○		○	○	○
MOIRE_CLEAR	○		○	○	○
MOIRE_LEVEL	○		○	○	○
ADJUST_VR		○	○	○	○
H_POSI	○	○	○	○	
V_POSI	○	○	○	○	
V_LIN	○	○	○	○	
VLIN_BALANCE		○	○	○	○
CENTER_PCC		○	○	○	○
CORNER_PCC		○	○	○	○
CENTER_BALANCE	○	○	○	○	
CORNER_BALANCE	○	○	○	○	
CLAMP_PULSE_POSI	○	○	○	○	
PURITY	○	○	○	○	
VIDEO_LEVEL		○	○	○	○
HLIN(CS)				○	○
PCC_FREE				○	○
BAL_FREE				○	○
PCC-BALANCE				○	○
VLIN_PHASE				○	○
VLIN_FREE				○	○
DBFH_AMP				○	○
DBFH_FREE				○	○
DBFH_PHASE				○	○
DBFV_AMP				○	○
DBFV_FREE				○	○
R_BIAS color1			○	○	○
G_BIAS color1			○	○	○
B_BIAS color1			○	○	○
R_BIAS color2			○	○	○
G_BIAS color2			○	○	○
B_BIAS color2			○	○	○
R_BIAS color3			○	○	○
G_BIAS color3			○	○	○
B_BIAS color3			○	○	○
HOSC-LOW-H1			○		
HDRIVE-N-LOW-H1				○	
+B-LOW-H1					○
ABL-ADJUST					○
BRIGHT-CENT/MAX				○	

2.4 Video block

2.4.1. Video signal amplifying circuit (R-Channel only)

1) The video signal input from BNC (J301) and D-SUB (PIN-1 of J3P6) are terminated with R3D8 (75Ω), R3C8 and R3C9 (parallel connection of 150Ω) respectively.
2) The BNC or D-SUB input video signal is selected according to the input changeover circuit configured of the Q309 and Q310 emitter connection, and is applied on PIN-6 of the pre-amplifier IC301.
3) IC301 is a video amplifier having a wide band width up to a frequency of 220MHz. There are two power source, one is the main amplifying circuit power supply Vcc1 (PIN-4, PIN-7), and the other is the output driver power supply Vcc2 (PIN-16), which are separated at a high frequency with LC301 and LC302.
4) Sub-contrast control can be executed by changing the output amplitude (6dBMax) through DC controlling PIN-9 of IC301. This allows the adjustment of the chromacity.
5) The clamp signal is inputted in PIN-14 of IC301, and charges C307 connected to PIN-12 so that the DC voltage of IC301 PIN-18 and the feedback voltage from the output step IC (IC302) applied on IC301 PIN-19 are the same during clamping period. This allows the signal's black level to the kept constant.
6) The video output signal from PIN-17 of IC301 passes through the mixing circuit of OSD (On Screen Display) configured of the dual gate FET Q303 and Q304, etc., and is supplied to PIN-4 of the output step amplifier (IC302) via the level shift/drive circuit configured of Q305, Q306 and D303, etc.
7) The output step amplifier (IC302) incorporates a cascade type VPA15. PIN-9 of IC302 is the power supply terminal (70V), and the output pin is PIN-8.
8) The cut-off circuit is configured of the IC303 shunt regulator and Q307 and Q308, etc. The gate voltage of IC303 is changed with the R-BIAS DC control, and varies the cathode black level.

2.4.2. Synchronous separated circuit

1) The synchronization signal from BNC (H-J3P4, V-J3P5) passes through the AC connection, and is input in PIN-14 (H) and PIN-4 (V) of the IC (IC3P5) for amplitude conversion. The synchronization signal that has been TTL amplitude converted by IC3P5 is output from PIN-12 (H) and PIN-6 (V), and is input in PIN-13 (H) and PIN-3 (V) of the digital switch IC (IC3P9).
2) The synchronization signal from D-SUB (H-PIN13, V-PIN14) is input in PIN-14 (H) and PIN-2 (V) of IC3P9, and the BNC or D-SUB input is selected by controlling PIN-1 to Low or Hi. The IC3P9 synchronization output signals are each output from PIN-12 (H) and PIN-4 (V).
3) Green-on Sync is selected with the analog switch configured of Q372, Q373, D308 or D309, etc., by the Green-video signal line for each BNC and D-SUB, and is input to PIN-9 of the synchronization signal detection IC (IC3P5) via the AC connection. Only the synchronization signal is detected by IC3P5, and the TTL amplitude converted composite synchronization signal is output from PIN-11 of IC3P5.

2.4.3. Automatic calibration waveform detection circuit

1) The red, green and blue channel video signals are each detected by the OR circuit connected to the Q311, Q341 and Q371 emitter. These video signals are DC clamped by the clamp circuit configured of Q3P6, D3P2 or Q3P7, etc.
2) The detection signal that amplitude converted to the TTL level by the amplifying circuit configured of Q3P3, Q3P4 or Q3P5, etc., is input in PIN-1 and PIN-10 of the mono/multi-vibrator (IC3P3). The image signal input in PIN-1 of IC3P3 is latched at the falling edge of the signal, and is output from PIN-5 with the pulse width determined by the CR time constant of R3S3 and Q3R2 connected to PIN-7. The image signal input in PIN-10 of IC3P3 is latched at the rising edge of the signal and is output from PIN-13 with the pulse width determined by the CR time constant of R3S2 and C3R0 connected to PIN-15.
3) The detection signal output from PIN-5 and PIN-13 of IC3P3 are each input into PIN-9 and PIN-8 of the NOR circuit (IC3P4), and the NORed signal is output from PIN-10.

2.4.4. On Screen Display circuit (OSD)

1) IC3P2 is controlled by the serial clock input (PIN-2), serial data input (PIN-3), chip select input (PIN-4), vertical synchronization signal input (PIN-6) and horizontal synchronization signal input (PIN-7) at the PLL circuit.

   The clock that is fuse locked by the PLL function is output from PIN-18 to control the character and pattern display control IC (IC3P1).

2) IC3P1 is a display control IC having a character ROM built-in maximum display input frequency Fosc = 20M~50MHz. IC3P1 is controlled by the display clock input (PIN-1, PIN-2), chip select input (PIN-3), serial clock input (PIN-4), serial data input (PIN-5), horizontal synchronization input signal (PIN-19) and vertical synchronization input signal (PIN-19).

   The OSD video signals red, green and blue are respectively output fro PINs 13, 15 and 17, and the OSD image signal and same phase blanking signal is output from PIN-12.

3) The OSD mixing signal (R-Channel only) is configured of the dual gate FET and Q303, Q304 source connection. The OSD video signal from PIN-13 of IC3P1 passed through the buffer transistor Q301, and is DC clamped by the clamp circuit configured of Q302 or D302, etc. The clamped OSD video signal passes through Q303 lifted to the HI level by the Q303 gate 2 (G2). On the other hand, the image signal from BNC (J301) and D-BUS (PIN-1 of J3P5) cut off as gate 2 (G2) of Q304 is set to the Low level (blanking period) during OSD adjustment.

3. Adjustment Procedure

3.1. Application

This describes the adjustment and overhaul for HR monitor of THN9105 series.

3.2. Range of adjustment and overhaul

This describes that it is enable to be over all-adjustment. Adjust and confirm according to the needs of overhaul.

Table 1. Type

Type	Model name	Reference
1	For Own brand	THN9105 series

3.3. Tester

1)	Signal generator A	equivalent to VG-812 made in Astrodesign
2)	Signal generator B	equivalent to VG-819 made in Astrodesign
3)	DC voltmeter	150V class 0.5 or digital voltmeter
4)	High voltmeter	class 0.5 that is enable to measure 30KV
5)	Intensity meter	Minolta Color Analyzer: equivalent to CA-100
6)	AC voltmeter	150V/300V class 0.5
7)	Syncroscope	More than 200MHz width
8)	Variable AC-voltage Power Unit	Variable range 0 to less than 260V
9)	Double Scale	For the measurement of the width and distortion
10)	Insulation resistance tester	KIKUSUI MODELTOS8650 or equality
11)	Frequency counter	equivalent to IWATSU SC-7101
12)	Granding continuity tester	Made in England; CLARE

Table 2. Adjustment Magnetic field

Type	Magnetic field	Reference
1	HORIZ. 0mT VERT. Magnetic field by destination	

3.4. Monitor control names and functions

3.4.1 Structure of Front Control Panel

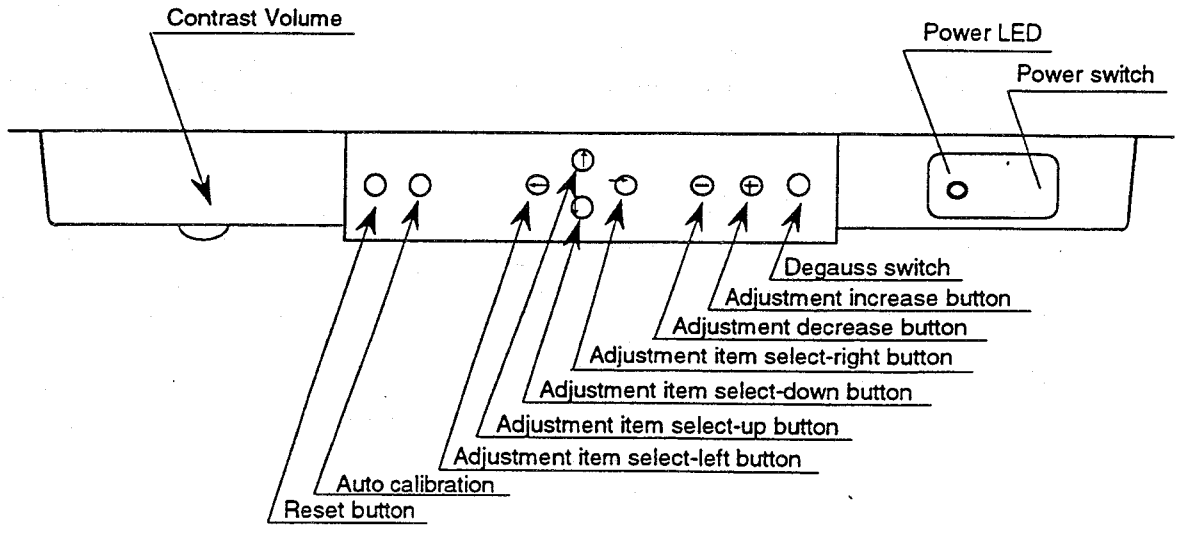


Figure 1. Front control panel

3.4.2 Structure of Rear Input Connector

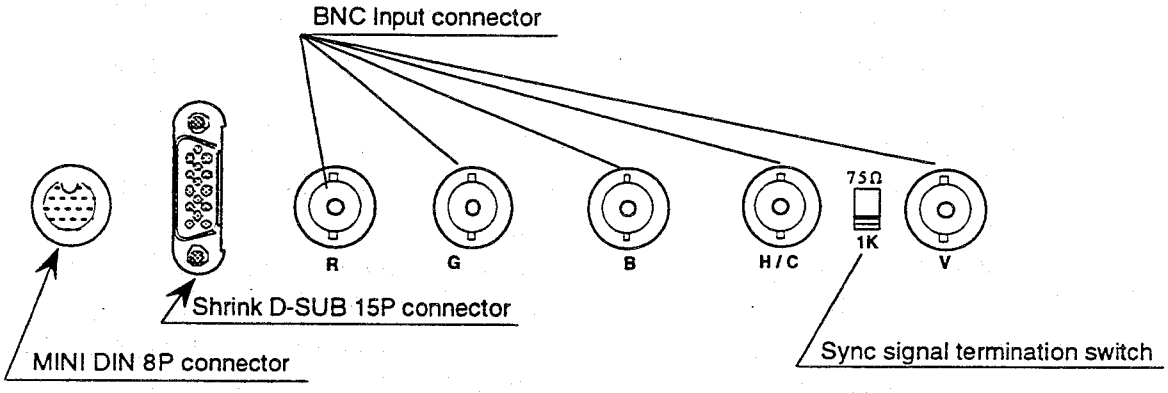


Figure 2. Rear input connector

(2) Option (Correspond to loop through)

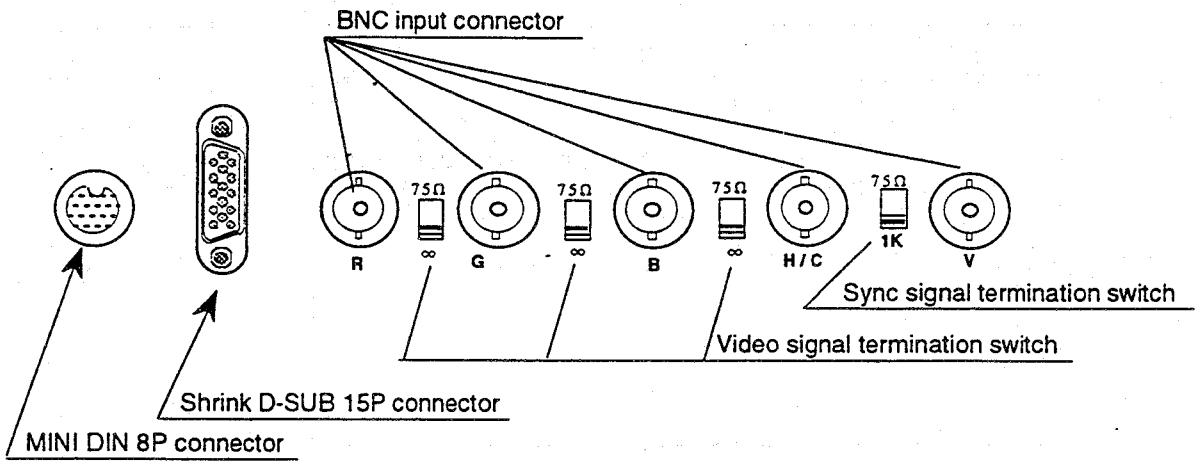


Figure 3. Rear input connector (option)

3.4.3 Adjustment Item OSD Screen Matrix

Table 3. Adjustment items OSD screen matrix

CONTRAST				
BRIGHT				
CONNECTOR				
H-SIZE	H-PHASE	V-SIZE	V-PHASE	
PCC-AMP	PCC-PHASE	PIN-BAL	KEY-BAL	
ROTATION	H-STATIC			
COLOR-1 R	COLOR-2 R	COLOR-3 R	}	
COLOR-1 G	COLOR-2 G	COLOR-3 G	} BALANCE	
COLOR-1 B	COLOR-2 B	COLOR-3 B	}	
POWER-SAVE				
MOIRE-CLEAR				
LEVEL				
ADJUST-VR				
H-POSI				
V-POSI				
V-LIN				
V-LIN-BAL				
CENTER-PCC				
CORNER-PCC				
CENTER-BAL				
CORNER-BAL				
CLAMP-PULSE				
PURITY				
VIDEO LEVEL				
H-LIN				
FREE-PCC ADRESO	FREE-PCC ADRES1	FREE-PCC ADRES2	FREE-PCC ADRES3	FREE-PCC ADRES4*
FREE-BAL ADRESO	FREE-BAL ADRES1	FREE-BAL ADRES2	FREE-BAL ADRES3	FREE-BAL ADRES4*
PCC-BAL				
V-LIN-PHASE				
V-LIN-FREE ADRESO	V-LIN-FREE ADRES1	V-LIN-FREE ADRES2	V-LIN-FREE ADRES3	V-LIN-FREE ADRES4*
DBF H-AMP				
DEB H-FREE ADRESO	DEB H-FREE ADRES1	DEB H-FREE ADRES2	DEB H-FREE ADRES3	DEB H-FREE ADRES4
DBFH-PHASE				
DBFV-AMP				
DBFV-FREE ADRESO	DBFV-FREE ADRES1	DBFV-FREE ADRES2	DBFV-FREE ADRES3	DBFV-FREE ADRES4
COLOR-1 R	COLOR-2 R	COLOR-3 R	}	
COLOR-1 G	COLOR-2 G	COLOR-3 G	} CUT OFF	
COLOR-1 B	COLOR-2 B	COLOR-3 B	} (BIAS)	
HOSC LOW	HOSC M1	HOSC M2	HOSC H1	HOSC H2
HDRIVE-N-LOW	HDRIVE-N-M1	HDRIVE-N-M2	HDRIVE-N-H1	
HDRIVE-W-LOW	HDRIVE-W-M1	HDRIVE-W-M2	HDRIVE-W-H1	
+BVOLTAGE LOW	+BVOLTAGE M1	+BVOLTAGE M2	+BVOLTAGE H1	
ABL-ADJUST				
BRIGHT-CENT	BRIGHT-MAX			

*Continue to ADRESS31

3.5. Initial inspection

1) Assemble according to the drawing instruction.
2) The PCB has no crack and bad stain.
3) The PCB parts is not floated, tilted, and contacted with other parts.
4) Connectors do not have the crimp defective and are inserted exactly.
5) The TR socket, the CRT socket, and the anode cap are fitted exactly.
6) Lead wire is not pressed by the edge of the plate.
7) Lead wire is not contacted with the high temperature parts of the R-METAL, the R-CEMENT, and the TR with the FIN.
8) Plates have no bending, bad stain, and bruises.
9) CRT has no bruises and breakage.
10) Each VR and the encoder rotate smoothly.
11) Each VR is sure to be set the following positions before powering on.

Table 4. Initial setting for VR

PCB name	Number	Name (Symbol)	Initial adjustment position		Reference
PWB-MAIN	VR601	X-PRO	Turn to the counterclock-wise completely.		
	VR600	HV-ADJ	Turn to the counterclock-wise completely.		
		FOCUS1	Center		FBT
		FOCUS2	Center		FBT
		SCREEN	Turn to the counterclock-wise completely.		FBT
PWB-CONTROL	SW101	MODE SELECT SW	CRT neck side		Normal mode
PWB-VIDEO	SW3P1	SYNC TERMINATION	Type 1	Up side	75Ω side
			Type 2	Down side	1kΩ side
PWB-GI/DBF	VR800	SUB-BRIGHT	Center		
FRONT		CONTRAST	Max		

3.6. Adjustment (Normal temperature)

Power supply can detect 120V AC or 220-240V AC and 50 or 60 Hz.

3.6.1 Screen Adjustment Timing

Adjust the screen according to the following timing.

From No. A to G is not the preset timing but the factory preset timing for adjusting H free run, +B, and the H-DRIVE.

Table 5. Adjustment timing

Timing No.	Frequency		Specification and adjustment frequency			Preset Classification
	FH	FV	H FREE RUN	+B	HDRIVE	
A	30.0K	70Hz	O_L	O_L	O_L	USER
B	56.0K	70Hz	O_{M1}	O_{M1}	O_{M1}	
C	84.0K	82Hz	O_{M2}	O_{M2}		
D	86.0K	82Hz			O_{M2}	
E	88.0K	82Hz	O_{H1}			
F	104.2K	82Hz	O_{H2}	O_{H1}	O_{H1}	▼
G	61.3K	76Hz	For confirming the AUTO CALIBRATON FUNCTION			

	Type 1				
No.	Timing specification			Preset Classification	
1	31.5K	70Hz	VGA : 640x400	PRESET	
2	31.5K	60Hz	VGA : 640x480		
3	56.5K	70Hz	VESA : 1024x768		
4	68.7K	75Hz	AP 21 : 1152x870		
5	60K	75Hz	VESA : 1024x768		
6	76.6K	72.1Hz	VESA : 1280x1024		
7	80K	75Hz	VESA : 1280x1024		
8					
9	92.77K	74.8Hz	MIRO 1 : 1600x1200	▼	
10					
11					
12					

3.6.2 Initialize the Adjustment Data in the EEPROM (NOTICE : This item is not need for usual repair.)

Initialize the adjustment data in the EEPROM according to the following file.

The initialized adjustment data file name

Type	Initialize data file name	Revision data	Reference
1	THN_OWN. DAT		VER. A

3.6.3 Pre-adjustment

Power on when the monitor has no signal, then adjust the "SCREEN" of focus pack to be the suitable brightness, and adjust the "FOCUS 1, 2" of the fucus pack to clear the both sides of the screen.

3.6.3.1 Horizontal free run frequency adjustment

A) Input the following timing No. A.

B) Set the SW 101 on the PWB-CONTROL to the center and to be free run.
(The OSD screen adjustment item selects the HOSC LOW.)

C) Adjust the horizontal free run frequency as follows by the (+) and the (-) buttons (adjustment the increase and the decrease buttons).
30KHz±0.2KHz (Adjust the flow of the screen to the left figure.)

D) Input the timing No. B, C, D, E, and F and select each adjustment item that is equivalent to table 6, and then adjust the each frequency.

Table 6. Horizontal free run adjustment

TIMING NUMBER	OSD ADJUSTMENT ITEM	FREE RUN FREQUENCY
A	HOSC-L	30.0KHz±0.2KHz
B	HOSC-M1	56.0KHz±0.2KHz
C	HOSC-M2	84.0KHz±0.2KHz
E	HOSC-H1	88.0KHz±0.2KHz
F	HOSC-H2	104.2KHz±0.2KHz

3.6.3.2 High voltage pre-adjustment

A) Set the SW101 on the PWB-CONTROL to the CRT neck.

B) Input the only sync signal of timing 9 (MORO 1) and connect the high voltmeter to the CRT anode.

C) Adjust the voltage to 30.0KV±0.1KV with VR600 (HV-ADJ) on the PCB-MAIN.

D) Turn VR601 (X-PRO) slowly to the right and confirm that the high voltage protector works.

E) Adjust the voltage to 27.0KV±0.3KV with VR600 (HV-ADJ) on PCB-MAIN.

3.6.3.3 +B adjustment

A) Set the SW101 on the PWB-CONTROL to the CRT face.(FACTORY MODE)

B) Input each sync signal of the timing No. A, B, C, and F. Set the OSD screen to the H-SIZE and then adjust the value of the bar chart to each value of the table 7 by the (+) and the (-) buttons.

C) Input each signal of the timing No. A, B, C and F. Adjust the +B to each value for screen size of the table 7.

Table 7. How to adjust +B (pre-adjustment)

TIMING NUMBER	OSD ADJUSTMENT ITEM	H-SIZE DATA	SCREEN SIZE
A	+BVOLTAGE-L	140	
B	+BVOLTAGE-M1	110	380mm
C	+BVOLTAGE-M2	130	±10mm
F	+BVOLTAGE-H1	110	

3.6.3.4 H-DRIVE adjustment

A) Insert one of JIG to J507 and connect the other to the digital voltmeter.

B) Input the timing No. A. Set the OSD screen to the H-DRIVE-N-LOW and then adjust the voltage to the minimum by the (+) and the (-) buttons as looking the digital voltmeter. (Refer to the note.)

C) Set the OSD screen to the H-DRIVE-W-LOW with the (▽) button and then adjust the voltage to the minimum by the (+) and the (-) buttons as looking the digital voltmeter. (Refer to the note.)

D) Set the OSD screen to the H-DRIVE-N-LOW and then adjust the voltage to the minimum by B) Input the timing No. A. Set the OSD screen to the H-DRIVE-N-LOW and then adjust the voltage to the minimum by the (+) and the (-) buttons as looking the digital voltmeter. (Refer to the note.)as looking the digital voltmeter.

E) Input the timing No. B, D and F. Select the adjustment items that is equivalent to each value of the following table , and then adjust each voltage to the minimum.
(Note; In case of only the H-DRIVE-N-L/H-DRIVE-W-L, reduce the voltage by 10 counts from the mini mum.)

Table 8. Adjustment the items and the timing for the horizontal drive conditions

TIMING NUMBER	OSD ADJUSTMENT ITEM
A	HDRIVE-N-L, HDRIVE-W-L
B	HDRIVE-N-M1, HDRIVE-W-M1
D	HDRIVE-N-M2, HDRIVE-W-M2
F	HDRIVE-N-H1, HDRIVE-W-M1

3.6.3.5 Shocking test

A) Display "COLOR BAR" by signal the generator A.

B) Confirm that the image comes normally when giving the shock to the monitor.

3.6.3.6 Pre-adjustment before aging

A) Display the full white raster by the signal generator A.

B) Confirm that the image of each channel R, G, B comes.

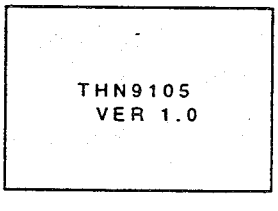
C) Comfirm that it is enable to control the H-CENT, screen position, screen size, PCC, and balance and adjust.

D) Set the power management to OFF.

E) Set the SW101 on the PWB-CONTROL to the CRT face.(FACTORY MODE)

F) After disconnecting the signal and confirming that the following image is displayed by the OSD screen, continue the heat run for more than 30 minutes.

Figure 4. OSD screen on aging



3.6.4 Adjustment

3.6.4.1 Horizontal free run frequency adjustment

A) Input the timing No. A.

B) Set SW 101 on the PWB-CONTROL to the center and to be free run.
(The adjustment item of the OSD screen selects the HOSC LOW.)

C) Adjust the horizontal free run frequency as follows by the (+) and the (-) buttons (adjustment the increase and the decrease buttons).

30KHz±0.2KHz

D) Input the timing No. B, C, D, E, and F and select each adjustment item that is equivalent to the table 6, and then adjust the each frequency.

3.6.4.2 Voltage setting the high voltage protector works

(1) Set the SW101 on the PWB-CONTROL to the CRT neck.

(2) Turn the "SCREEN" of the focus pack completely to the counterclockwise.

(3) Connect the high voltmeter to the CRT anode.

(4) Turn VR600 (HV-ADJ) slowly to the right and set the voltage to 30±0.3KV.

(5) Turn VR601 (X-PRO) slowly to the right and set the voltage to the position that the high voltage protector works. (Confirm that the high voltage output is 0V.)

(6) Cover VR601with the DHHS-CAP. Use the adhesive TSE3940.
(As to the assemble process, apply to the ASSY-COLOR-DISPLAY CT900A121)

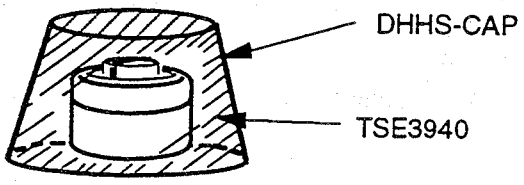


Figure 5. DHHS-CAP

3.6.4.3 High voltage adjustment

(1) Input the only sync signal of the timing No. 9 and connect the high voltmeter to the CRT anode.

(2) Turn the "SCREEN" of the focus pack completely to the counterclockwise.

(3) Adjust VR600 (HV-ADJ) and set the voltage to 27±0.3KV.

(4) Turn the power switch ON-OFF (every 5 seconds.) more than three times after adjusting, and confirm that the high voltage protector does not work.

(5) Fix VR600 with TSE3940. (How to fix is same as VR601.)

3.6.4.4 +B adjustment

(1) Set the SW101 on the PWB-CONTROL to the CRT face.(FACTORY MODE)

(2) Input the signal of the timing No. A and set the OSD screen to the H-SIZE, and then adjust the value of the bar chart to 140 by the (+) and the (-) buttons.

(3) Select the +B VOLTAGE-LOW and adjust the horizontal width of the image on the screen to the following value.

380mm±5mm (screen range) by the (+) and the (-) buttons

(4) Input the timing No. B, C, and F. After adjusting the value of the bar chart to the one of the following table and select the adjustment items that is equivalent to each value, and then adjust the horizontal width of the image on the screen to each value of the following table.

Table 9. How to adjust +B

TIMING NUMBER	OSD ADJUSTMENT ITEM	H-SIZE DATA	HORIZONTAL SCREEN WIDTH
A	+BVOLTAGE-L	140	380mm±5mm
B	+BVOLTAGE-M1	110	380mm±5mm
C	+BVOLTAGE-M2	130	380mm±5mm
F	+BVOLTAGE-H1	110	380mm±5mm

3.6.4.5 H-DRIVE adjustment

A) Insert one of JIG to J507 and connect the other to the digital voltmeter.

B) Input the timing No. A. Set the OSD screen to the H-DRIVE-N-LOW and then adjust the voltage to the minimum by the (+) and the (-) buttonsas looking the digital voltmeter. (Refer to the note.)

C) Set the OSD screen to the H-DRIVE-W-LOW and then adjust the voltage to the minimum by the (▽) button as looking the digital voltmeter. (Refer to the note.)

D) Set the OSD screen to the H-DRIVE-N-LOW and then adjust the voltage to the minimum by the (+) and the (-) buttons as looking the digital voltmeter.

E) Input the timing No. B, D, and F. Select the adjustment items that is equivalent to each value of the table 8 above-mentioned, and then adjust each voltage to the minimum.
(Note; In case of the H-DRIVE-N-L/H-DRIVE-W-L only, reduce the voltage by 10 counts from the minimum.)

3.6.5 Screen size, position and distortion adjustment

The manual adjustment is explained below. Adjust on the factory mode. The following adjustments are available for all of the preset timings except 6-5-2.

3.6.5.1 How to change the adjustment mode to the factory mode

(1) Change with the switches

Turn the SW101 on the PWB-CONTROL "ON" at the CRT neck (NORMAL MODE) and then set the switch to the CRT face (FACTORY MODE).

(2) Change with the switch on the front panel

A) Press the DEGAUSS button.

B) Press the (◁) and the (+) buttons simultaneously as soon as pressing the DEGAUSS button.

C) Comfirm that the LEVEL-10 is displayed on the OSD screen and set the level to the LEVEL-15 with the (+) button.

D) Press the (◁) and the (▷) buttons simultaneously.
The adjustment mode is entered to the factory mode as above.
In this case the free run frequency, +B and the H-DRIVE are unable to adjust. These adjustment mode, if necessary, is entered to the factory mode with the (1) step.

3.6.5.2 Screen tilt adjustment

Input the crosshatch pattern with the frame of the timing No. 9 (MIRO 1).

(1) Display the back raster with the SCREEN-VR on the focus pack.

(2) Set the OSD screen to the ROTATION with the SELECT buttons on the front panel and adjust the raster tilt to the horizontal to the CRT face with the (+) and the (-) ADJUST buttons.

3.6.5.3 Raster position adjustment

Input the crosshatch pattern with the frame.

(1) Display the back raster with the SCREEN-VR on the focus pack.

(2) Input the adjustment timing of the pattern with the crosshatch. Set the OSD screen to the H-POSI TION with the SELECT buttons on the front panel, and adjust the horizontal raster position to the center of the screen with the (+) and the (-) ADJUST buttons.
In this case adjust the raster width to 390±10mm and | L1 — L2 |≦3mm.

3.6.5.4 Vertical linearity, vertical width, and position of the screen adjustment

(Input the crosshatch pattern.)

(1) Set the OSD screen to the V-POSITION with the SELECT buttons on the front panel, and adjust the vertical raster position to the center of the screen with the (+) and the (-) ADJUST buttons.

(2) Set the OSD screen to the V-LIN or the V-LIN-BAL with the SELECT buttons on the front panel, and adjust the vertical linearity so that the size of the screen's top, center and bottom grids are equal with the (+) and the (-) ADJUST buttons.

(3) Set the OSD screen to the V-SIZE with the SELECT buttons on the front panel, and adjust the vertical screen width to 285±4mm with the (+) and the (-) ADJUST buttons.

(4) Confirm that the V-PHASE is set as follows. If the re-adjustment is necessary, set the OSD screen to the V-PHASE with the SELECT buttons on the front panel, and adjust as follows with the (+) and the (-) ADJUST buttons.

	Leave 3 lines raster at the bottom of the image	Position the image to the center of the raster
Type 1	Timing No. 3~7, 9	Timing No.1, 2

(5) Set the OSD screen to the V-POSITION with the SELECT buttons on the front panel, and adjust the vertical position to the center of the screen with the (+) and the (-) ADJUST buttons.
In this case adjust the raster width to 390±10mm and | L4 — L3 |≦3mm.

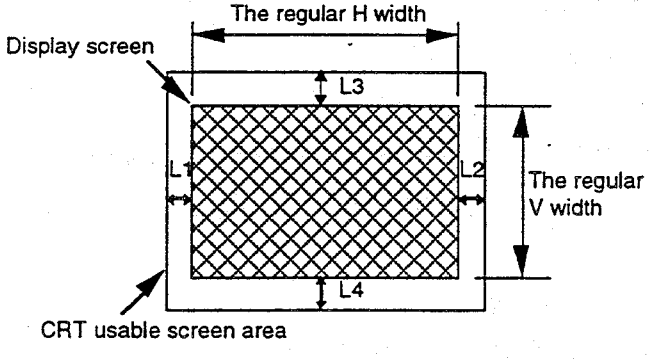


Figure 6. Screen width and position adjustment

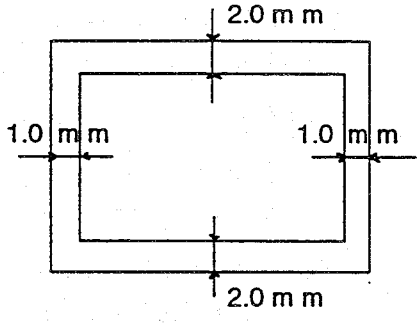


Figure 7. Screen tilt and distortion adjustment

3.6.5.5 Left and right distortion, horizontal width and position of screen adjustment
(Input full white raster signal.)

(1) Set the OSD screen to the H-PHASE with the SELECT buttons on the front panel, and adjust the hori zontal position to the center of the screen with the (+) and the (-) ADJUST buttons.

(2) Set the OSD screen to the PCC-AMP, the PCC-PHASE, the CENTER-PCC, and the CORNER-PCC with the SELECT buttons on the front panel, and adjust the vertical lines on the both sides of the screen to the straight with the (+) and the (-) ADJUST buttons.
If the distortion on the left and right sides of the screen differs, set the OSD screen to the PIN BAL-ANCE, the KEY-BALANCE, the CENTER-BAL, and the CORNER-BAL with the SELECT buttons on the front panel, and with the (+) and the (-) ADJUST buttons adjust so that the left and right sides are visually balances.

(3) Set the OSD screen to the H-SIZE with the SELECT buttons on the front panel, and adjust the hori zontal screen width to the value of Table 10 with the (+) and the (-) ADJUST buttons.

(4) Confirm the screen distortion. If the vertical lines on both sides of the screen are not straight, set the OSD screen to the FREE-PCC and FREE-BAL with the SELECT buttons on the front panel, and adjust the distortion as follows.

A) In case that the distortion on the left and right sides of the screen differs:
Set the OSD screen to the FREE-BAL with the SELECT buttons on the front panel and with the (◁) and the (▷) buttons adjust the address to any position so that the left and right sides are visually balanced.

B) Adjust the vertical lines on both sides of the screen to the straight .
Set the OSD screen to the FREE-PCC with the SELECT buttons on the front panel. Set the address to the distorted position with the (◁) and the (▷) buttons and adjust the vertical lines on both sides of the screen to the straight with the (+) and the (-) ADJUST buttons.

Put the outline of the screen into the frame shown in the Figure 7 by the adjustment above-mentioned.

Table 10. The horizontal screen width adjustment value

No.	Type 1			
	Timing specification	Horizonal screen width		
1	VGA : 640x400	380±5mm		
2	VGA : 640x480			
3	VESA : 1024x768			
4	AP 21 : 1152x870			
5	VESA : 1024x768			
6	VESA : 1280x1024	356±5mm		
7	VESA : 1280x1024			
8				
9	MIRO 1 : 1600x1200	380±5mm		
10				
11				
12				

3.6.5.6 DBF amplitude/phase adjustment (NOTICE : This item is not need for usual repair.)

(1) Connect the synchroscope to the TP-DBF on the PWB-MAIN and the R video signal output.

(2) Set the SW101 on the PWB-CONTROL to the CRT face (FACTORY-MODE).

(3) Set the OSD screen to the DBF-H-AMP with the SELECT buttons on the front panel, and adjust the horizontal parabola wave amplitude to the following value with the (+) and the (-) ADJUST buttons.
280V±10V (the image range)

(4) Set the OSD screen to the DBF-V-AMP with the SELECT buttons on the front panel, and adjust the vertical parabola wave amplitude to the following value with the (+) and the (-) ADJUST buttons.
150V±10V (the image range)

(5) Set the OSD screen to the DBF-H-PHASE with the SELECT buttons on the front panel, and with the (+) and the (-) ADJUST buttons adjust the horizontal parabola wave phase on the image signal as follows.

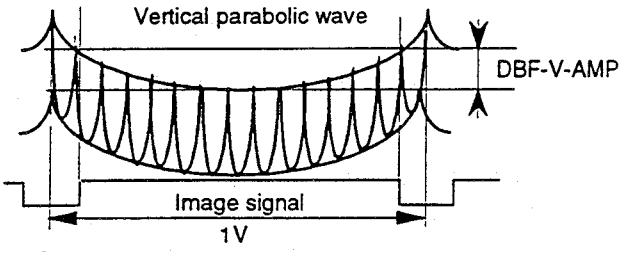


Figure 8. V • DBF amplitude adjustment

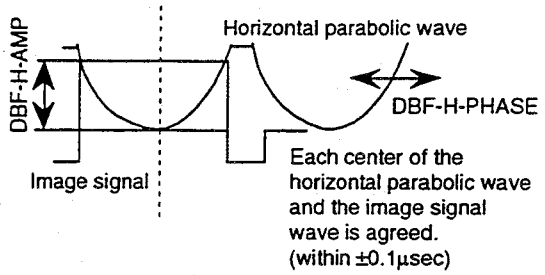


Figure 9. DBF-H-AMP/PHASE adjustment

Adjust the following with the timing No. 9. Set the SW101 on the PWB-CONTROL to the CRT face and adjust on the factory mode.

3.6.6 Cut off Adjustment

Input the full white raster signal of the timing No. 9.

3.6.6.1 Initial setting

(1) Set the OSD screen to the CUT OFF of the COLOR 1, 2, and 3 in order with the SELECT buttons on the front panel, and set all of the R, G, and B to "00".

(2) Set the OSD screen to the BRIGHT-CENT with the SELECT buttons on the front panel, and set the data of the screen to "60".

(3) Adjust the G2 to 600V with the SCREEN-VR on the focus pack.

(4) Turn the VR800 on the PWB-G1/DBF and set the back raster luminance to 0.5cd/m², ±0.1cd/m².

3.6.6.2 Cut off and back raster luminance adjustment

(1) Set the OSD screen to the BIAS for a color except the brightest color with the SELECT buttons on the front panel. Classify the color temperature of the back raster into the COLOR 1, the COLOR 2, and the COLOR 3 and adjust with the (+) and the (-) ADJUST buttons as follows.

Table 11. Cut off adjustment

	Color	1	2	3	Allowable difference
Type 1	x	0.283	0.316	0.283	±0.015
	y	0.297	0.326	0.297	±0.015

(2) Set the OSD screen to the COLOR 1 (R, G, B-BIAS 1) with the SELECT buttons on the front panel.

(3) Set the OSD screen to the BRIGHT-CENT with the SELECT buttons on the front panel, and adjust the back raster luminance to 0.3cd/m², ±0.1cd/m² with the (+) and the (-) ADJUST buttons.
In this case confirm that the data is 216 and under. In the case of 216 and over, re-adjust the luminance in the following steps.

A) Set the OSD screen to the BRIGHT-CENT with the SELECT buttons on the front panel, and set the data of the screen to "60" with the (+) and the (-) ADJUST buttons.

B) Turn the VR800 on the PWB-G1/DBF and set the back raster luminance to 0.5cd/m².

C) Re-adjust the above step (3) and confirm the color temperature.

(4) Set the OSD screen to the BRIGHT-MAX with the SELECT buttons on the front panel, and set the back raster luminance to 3.0cd/m², ±0.2cd/m².

3.6.6.3 Confirm to operate after adjusting

(1) Set the OSD screen to the BRIGHT with the SELECT buttons on the front panel. Confirm that the back raster luminance is adjusted to 0.3cd/m² by pressing the (+) and (-) ADJUST buttons simulta neously.

(2) Confirm that the luminance of the BRIGHT increases to 3.0cd/m² by pressing the (+) button.

3.6.7 RGB Drive adjustment

Confirm that the VIDEO-LEVEL is set as shown in the Table 12.

Input the white window pattern signal and the full white raster signal of the timing No. 9.

(1) Set the OSD screen to the BRIGHT with the SELECT buttons on the front panel, and adjust the lumi nance to the BRIGHT-CENT by pressing the (+) and the (-) ADJUST buttons simultaneously.

(2) Set the OSD screen to the CONTRAST with the SELECT buttons on the front panel, and adjust to 235 with the (+) and the (-) ADJUST buttons.

(3) Set the output of the signal generator to the white window pattern and input the signal G only.

(4) Set the OSD screen to the G on the COLOR 3 with the SELECT buttons on the front panel, and adjust the luminance to the value of the following table with the (+) and the (-) ADJUST buttons.

(5) Input the signal R, G, and B and set the OSD screen to the COLOR 3-R, and the COLOR 3-B with the SELECT buttons on the front panel, and adjust the each color temperature to the value of the follow ing table with the (+) and the (-) ADJUST buttons.

(6) As to the adjustment of the luminance and the color temperature for the COLOR 1 and the COLOR 2 , follow the steps for the COLOR 3.

(7) Set the OSD screen to the COLOR 3 with the SELECT buttons on the front panel and set the output of the signal generator to the full white raster. Adjust so that the luminance is within the range 108cd/m², ±3cd/m² with the ABL-ADJUST.

(8) Display the full white raster and confirm the color temperature. (For only the center of the screen)

(9) Set the OSD screen to the CONTRAST with the SELECT buttons on the front panel and confirm that the difference of the color temperature value when the luminance is set to 30cd/m² with the ADJUST button and the initial value is within ±0.015 for both x and y.

Table 12. VIDEO LEVEL setting value

No.	Type 1			
	Timing specification	Setting value		
1	VGA : 640x400	0.7V		
2	VGA : 640x480			
3	VESA : 1024x768			
4	AP 21 : 1152x870			
5	VESA : 1024x768			
6	VESA : 1280x1024			
7	VESA : 1280x1024			
8				
9	MIRO 1 : 1600x1200			
10				
11				
12				

Table 13. RGB DRIVE adjustment

	Color		1	2	3	Reference
Type 1	G-WINDOW		78.0	68.0	78.0	(Referential value)
	W-WINDOW color coordination	x	0.283	0.316	0.283	±0.005
		y	0.297	0.326	0.297	±0.005
	Blank luminance (cd/m²)		108±3	Over 90	108±3	

3.6.8 Focus adjustment

As to the steps from (1) to (7), input the letter H pattern of the (Group 1 - the timing No. 6, Group 2 - the timing No. 7) and the crosshatch pattern.

As to the step (8), input the letter H of all the preset timing and the crosshatch pattern.

(1) Display the crosshatch pattern of the 3 colors.

(2) Display the letter H pattern of the 3 colors.

(3) Turn the VR (STATIC) on the FOCUS 1 and adjust the vertical lines of the letter H on the parts A and E to the finest.

(4) Turn the VR (DYNAMIC) on the FOCUS 2 and adjust the vertical line of the letter H on the part C to the finest.

(5) Confirm that the focuses of the center and the peripheral are uniformed on the screen. If not uni formed, adjust the focuses to be uniformed on the screen by repeating the steps (3) and (4).

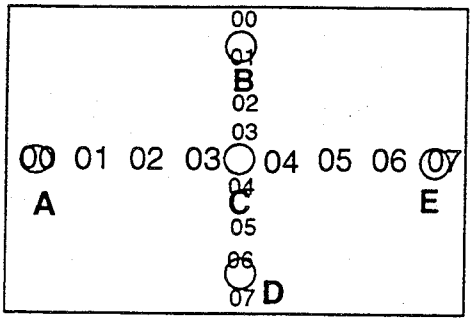


Figure 10. Focus attention point The numbers are the address of the DBFH-FREE and the DBFV-FREE.

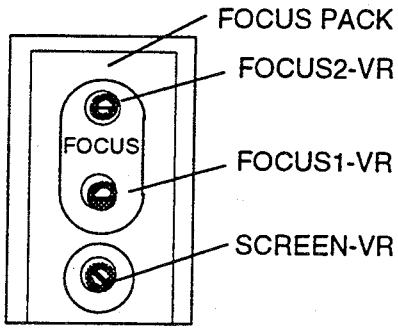


Figure 11. Focus pack

(6) When the DBF voltage is short or over, set the OSD screen to the DBFH-AMP and the DBFV-AMP

(6) When the DBF voltag is short or over, set the OSD screen to the DBFH-AMP and the DBFV-AMP with the SELECT buttons on the front panel, and adjust the AMP with the (+) and the (-) ADJUST buttons. Adjust the focuses to be uniformed on the screen by repeating the steps (3) and (4).

(7) As to all of other preset timing, when the DBF voltage is short or over, set the OSD screen to the DBFH-AMP and the DBFV-AMP with the SELECT buttons on the front panel, and adjust the focuses with the (+) and the (-) ADJUST buttons.

3.6.9 Convergence adjustment (Display the crosshatch pattern of the Group 1 - the timing No. 6, Group 2 - the timing No. 7)

Adjust the following on the NORMAL mode.

(1) Set the OSD screen to the H-STATIC with the SELECT buttons on the front panel.

(2) Press the (+) and the (-) ADJUST buttons simultaneously. (In this case confirm that the data of the H-STATIC is displayed the level 50% on the screen.)

(3) Adjust the horizontal and the vertical convergence with the CP ring on the CRT.

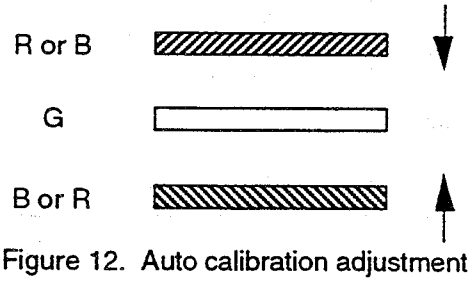


Figure 12. Auto calibration adjustment

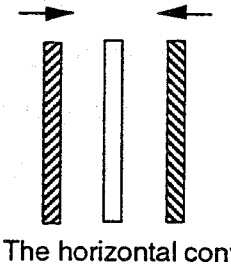


Figure 13. The horizontal convergence

3.6.10 Auto Calibration Adjustment

In case of adjusting with the manual, use the PC.

3.6.10.1 Timing

	fh<86kHz	fh≥86kHz
Type 1	TIMING No. 6	TIMING No. 9

3.6.10.2 Adjustment contents

After changing the following data, set up the auto calibration. Adjust the horizontal screen position as follows.

(The target value; I the factory adjustment position — the position after operating the auto calibration I≦ ±3mm.)

Timing	Data address		Data increase and decrease	
	EEPROM	RAM	When the screen is to the left.	When the screen is to the r ight.
fh<86k	17H	117H	INCREASE	DECREASE
fh≥86k	2CH	12CH	INCREASE	DECREASE

3.6.11Factory Preset

(1) Set the selection of the color temperature to COLOR-1 for all of the adjustment timing.

(2) Set the SW101 on the PWB-CONTROL to the CRT neck (NORMAL MODE) .

(3) Select the CONTRAST and the BRIGHT with the SELECT button on the front control panel. Press the (+) and the (-) ADJUST buttons simultaneously and adjust the CONTRAST to the MAX and the BRIGHT to the CENTER.

(4) Select the ROTATION with the SELECT button on the front control panel. Press the (+) and the (-) ADJUST buttons simultaneously and adjust to the CENTER.

(5) Select the H-STATIC with the SELECT button on the front control panel. Press the (+) and the (-) ADJUST buttons simultaneously and adjust to the CENTER.

(6) Select the PURITY with the SELECT button on the front control panel. Press the (+) and the (-) ADJUST buttons simultaneously and adjust to the CENTER.

Adjustment item	Setting contents	Setting classification	
		by timing	Common
CONNECTOR	BNC side		○
POWER-SAVE	ON		○
MOIRE-CLEAR	OFF	○	
MOIRE-CLEAR LEVEL	128	○	
ADJUST-VR	+ (+/- BOTTON side)		○
CLAMP-PLUSE	BACK	○	

(7) Set the adjustment items except the above items to the following table with the factory mode.

(8) Set the power switch to OFF.

(9) Set the SYNC TERMINATION change switch on the rear input connector as follows.

Type 1; Set to 1kΩ.

3.7 Inspection after adjustment

3.7.1 PCB, mechanism, and appearance

About inspection, follow to the steps from (1) to (9) of 5. Initial inspection.

3.7.2 Electrical capability

Inspect the electrical capability after setting the CONTRAST to the MAX and the BRIGHT to the CENTER by pressing the (+) and the (-) ADJUST buttons simultaneously.

3.7.2.1 Degaussing coil operating

Confirm that the screen vibrates and then stops when setting the DEGAUSS switch to ON on the front panel.

3.7.2.2 POWER SAVE function operating

Input the full white raster signal of the timing No.9 by disconnecting the GREEN signal.

(1) Set the OSD screen to the POWER SAVE with the SELECT buttons on the front panel and set the POWER SAVE function to ON with the (+) ADJUST button.

(2) Confirm that the screen darkens as soon as disconnecting the H-STATIC signal.
Confirm that the POWER LED blinks at 2-second intervals and that the consumption power is less than 110W.

(3) Confirm that the screen comes again as soon as inputting the H-SYNC.

(4) Disconnect the V-SYNC signal. After 5 seconds, display the POWER SAVE on the screen for 2 seconds and confirm that the high voltage goes down.
Confirm that the POWER LED blinks at 2-second intervals after the high voltage goes down. Confirm that the consumption power is less than 15W.

(5) Confirm that the screen comes again within 3 seconds after inputting the V-SYNC and that the high voltage restores.

(6) Disconnect the H-SYNC and V-SYNC signal simultaneously. After 5 seconds, display the POWER SAVE on the screen for 2 seconds and confirm that the high voltage goes down.
Confirm that the POWER LED blinks at 2-second intervals after the high voltage goes down. Confirm that the consumption power is less than 9W.

(7) Confirm that the screen comes again and brightens presently after inputting the H-SYNC and V-SYNC and that the high voltage restores.

3.7.2.3 Confirm the MOIRE-CLEAR function

After inputting the timing No. B, set the OSD screen to the MOIRE-CLEAR with the SELECT buttons on the front panel. Set the MOIRE-CLEAR function to ON and confirm that the screen vibrates to the horizontal.

3.7.2.4 Confirm the PURITY-CLEAR function

After inputting the full white raster signal of the timing No.9, set the OSD screen to the PURITY-CLEAR with the SELECT buttons on the front panel. Confirm that the color temperature at the peripheral of the screen changes by pressing the (+) and the (-) ADJUST buttons, and that the color temperature goes back to the level 50% by pressing the buttons simultaneously.

3.7.2.5 Focus and screen quality

The almost whole of the screen is clear.

3.7.2.6 Fix the parts

After finishing the adjustment inspection, fix the following VR with the lock-paint.

(1) Focus pack: FOCUS 1, FOCUS 2, and SCREEN-VR (The yellow or white paint)

3.7.2.7 Luminance and color uniformity

The ratio of the luminance at the center and at the peripheral is more than 75%.

The difference of the color temperature at the center and at the peripheral is $\Delta x, y < \pm 0.020$.

(Confirm the difference between the COLOR 2 and the COLOR 3 by the visual inspection. The difference of the color temperature at the center and at the peripheral between the COLOR 2 and the COLOR 3 is $\Delta x, y < \pm 0.012$. Do not change the color by the abrupt contrast change.

3.7.2.8 Confirm the luminance of the full white raster

Confirm that the luminance of the full white raster is the DRIVE signal adjustment timing and the following value.

More than 102cd/m^2

3.7.2.9 Confirm the color temperature of the full white raster

Confirm that the color temperature at the center of the full white raster is within the following value.

Table 14. Confirm the color coordination of the full white raster

	Confirmation items		COLOR 1	COLOR 2	COLOR 3
Type 1	Color coordination	x	0.283±0.010	0.316±0.010	0.283±0.010
		y	0.297±0.010	0.326±0.010	0.297±0.010

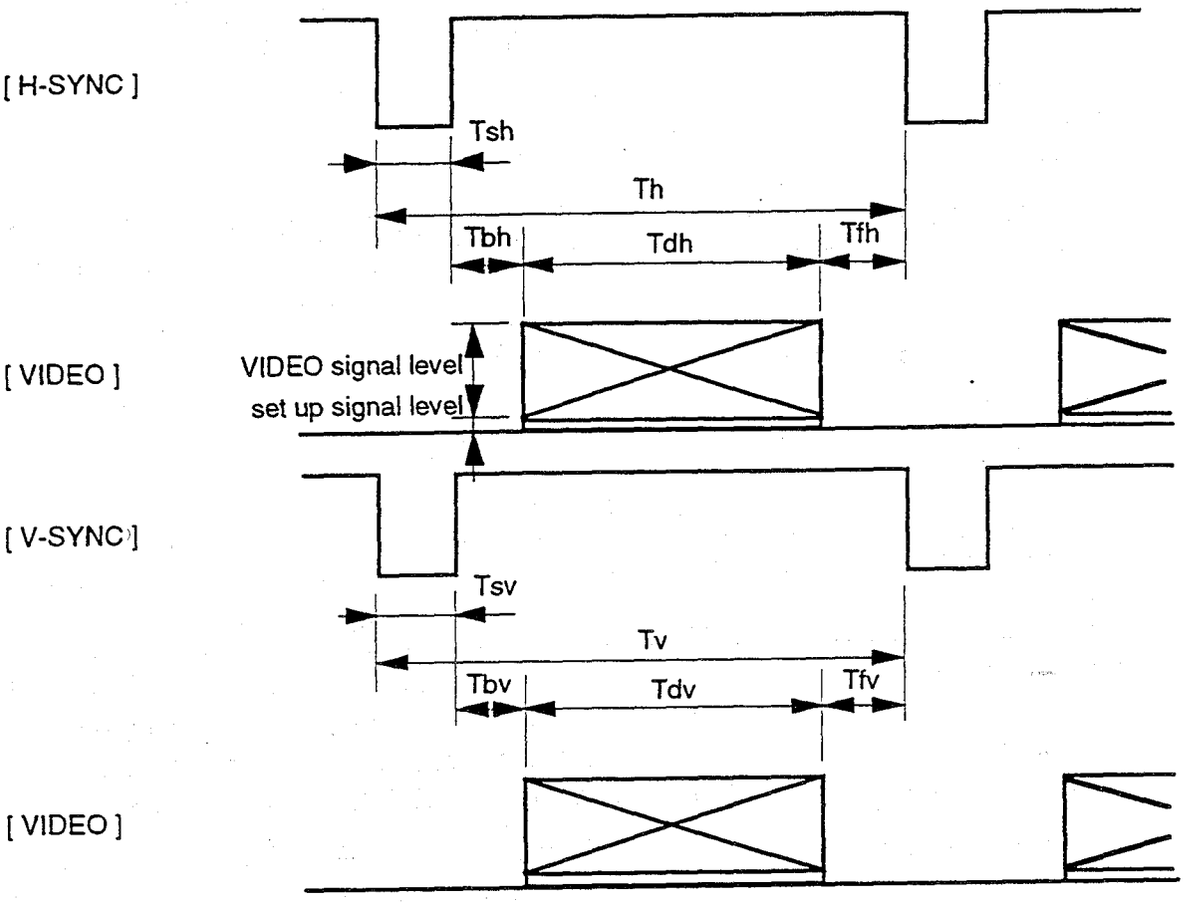
3.7.2.10 Others

(1) The change in pressing the PUSH buttons is smoothly and the noise and so on is normal.

(2) The phase does not flow by turning the power switch ON-OFF.

(3) Confirm that the POWER LED is turned ON.

3.8 Timing chart



* Refer to the next page for the preset timing

3.9 Adjustment timng

(1) Type 1 Preset timing (1/2)

Timing No.	1	2	3	4
Timing outline	31.5kHz/70Hz	31.5kHz/60Hz	56kHz/70Hz	60kHz/75Hz
Resolution	640X400	640X480	1024X768	1024X768
Timing name	VGA400	VGA480	VESA-56k/70	VESA-60k/75
Dot clock	25.18 MHz	25.18 MHz	75.00 MHz	78.75 MHz
Horizontal period (Th) (Horizontal frequency) (dots)	31.800 μsec (31.47 kHz) (800)	31.800 μsec (31.47 kHz) (800)	17.707 μsec (56.47 kHz) (1328)	16.660 μsec (60.02 kHz) (1312)
Horizontal sync pulse(Tsh) (dots)	3.81 μsec (96)	3.81 μsec (96)	1.813 μsec (136)	1.219 μsec (96)
Horizontal front porch(Tfh) (dots)	0.69 μsec (16)	0.69 μsec (16)	0.321 μsec (24)	0.203 μsec (16)
Horizontal back porch(Tbh) (dots)	1.90 μsec (48)	1.90 μsec (48)	1.920 μsec (144)	2.235 μsec (176)
Horizontal image screen (dots)	25.40 μsec (640)	25.40 μsec (640)	13.653 μsec (1024)	13.003 μsec (1024)
Vertical period (Tv) (Vertical frequency) (lines)	14.268 msec (70.09 Hz) (449)	16.683 msec (59.94 Hz) (525)	14.272 msec (70.07 Hz) (806)	13.328 msec (75.03 Hz) (800)
Vertical sync pulse (Tsv) (lines)	0.064 msec (2)	0.064 msec (2)	0.106 msec (6)	0.050 msec (3)
Vertical front porch (Tfv) (lines)	0.381 msec (12)	0.318 msec (8)	0.054 msec (3)	0.017 msec (1)
Vertical back porch (Tbv) (lines)	1.112 msec (35)	1.048 msec (35)	0.513 msec (29)	0.466 msec (28)
Vertical image screen(Tcv) (lines)	12.711 msec (400)	15.253 msec (480)	13.599 msec (768)	12.795 msec (768)
Sync signal input	Separate sync H : NEG V : POSI	Separate sync H : NEG V : NEG	Separate sync H : NEG V : NEG	Separate sync H : POSI V : POSI
Video signal level (Vp-p)	0.7	0.7	0.7	0.7
Set up signal level (Vp-p)	—	—	—	—

Type 1 Preset timing (2/2)

Timing No.	5	6	7	9
Timing outline	69kHz/75Hz	77kHz/72Hz	80kHz/75Hz	92.8kHz/75Hz
Resolution	1152×870	1280×1024	1280×1024	1600×1200
Timing name	APPLE 21"	VESA-77k/72	VESA-80k/75	MIRO 1
Dot clock	100.00 MHz	130.00 MHz	135.00 MHz	190.00 MHz
Horizontal period (Th) (Horizontal frequency) (dots)	14.560 μsec (68.68 kHz) (1456)	13.050 μsec (76.63 kHz) (1696)	12.504 μsec (79.97 kHz) (1688)	10.779 μsec (92.77 kHz) (2048)
Horizontal sync pulse(Tsh) (dots)	1.280 μsec (128)	1.230 μsec (160)	1.067 μsec (144)	1.011 μsec (192)
Horizontal front porch(Tfh) (dots)	0.440 μsec (44)	0.490 μsec (64)	0.118 μsec (16)	0.168 μsec (32)
Horizontal back porch(Tbh) (dots)	1.320 μsec (132)	1.480 μsec (192)	1.837 μsec (248)	1.179 μsec (224)
Horizontal image screen (dots)	11.520 μsec (1152)	9.850 μsec (1280)	9.482 μsec (1280)	8.421 μsec (1600)
Vertical period (Tv) (Vertical frequency) (lines)	13.322 msec (75.06 Hz) (915)	13.870 msec (72.10 Hz) (1063)	13.329 msec (75.02 Hz) (1066)	13.365 msec (74.82 Hz) (1240)
Vertical sync pulse (Tsv) (lines)	0.044 msec (3)	0.040 msec (3)	0.038 msec (3)	0.032 msec (3)
Vertical front porch (Tfv) (lines)	0.043 msec (3)	0.040 msec (3)	0.012 msec (1)	0.033 msec (3)
Vertical back porch (Tbv) (lines)	0.568 msec (39)	0.430 msec (33)	0.475 msec (38)	0.366 msec (34)
Vertical image screen(Tcv) (lines)	12.667 msec (870)	13.360 msec (1024)	12.804 msec (1024)	12.934 msec (1200)
Sync signal input	SYNC on Green	Separate sync H : NEG V : NEG	Separate sync H : POSI V : POSI	Separate sync H : NEG V : NEG
Video signal level (Vp-p)	0.7	0.7	0.7	0.7
Set up signal level (Vp-p)	—	—	—	—

(2) Factory adjustment timing (1/2)

Timing No.	A	B	C	D
Timing outline Resolution Timing name	30kHz/70Hz	56kHz/70Hz	84kHz/82Hz	86kHz/82Hz
Dot clock	24.04 MHz	74.53 MHz	145.46 MHz	145.46 MHz
Horizontal period (Th) (Horizontal frequency) (dots)	33.333 μsec (30.00 kHz)	17.850 μsec (56.02 kHz)	11.900 μsec (84.03 kHz)	11.627 μsec (86.01 kHz)
Horizontal sync pulse(Tsh) (dots)	4.000 μsec	1.710 μsec	1.000 μsec	1.000 μsec
Horizontal front porch (Tfh) (dots)	0.713 μsec	0.600 μsec	0.700 μsec	0.427 μsec
Horizontal back porch(Tbh) (dots)	2.000 μsec	1.800 μsec	1.400 μsec	1.400 μsec
Horizontal image screen (dots)	26.620 μsec	13.740 μsec	8.800 μsec	8.800 μsec
Vertical period (Tv) (Vertical frequency) (lines)	14.268 msec (70.09 Hz)	14.202 msec (70.09 Hz)	12.130 msec (82.44 Hz)	12.130 msec (82.44 Hz)
Vertical sync pulse (Tsv) (lines)	0.064 msec	0.106 msec	0.034 msec	0.034 msec
Vertical front porch (Tfv) (lines)	1.176 msec	0.053 msec	0.038 msec	0.038 msec
Vertical back porch (Tbv) (lines)	1.906 msec	0.511 msec	0.388 msec	0.388 msec
Vertical image screen(Tcv) (lines)	11.122 msec	13.532 msec	11.670 msec	11.670 msec
Sync signal input	Separate sync H : NEG V : NEG	Separate sync H : POSI V : POSI	Separate sync H : NEG V : NEG	Separate sync H : NEG V : NEG
Video signal level (Vp-p)	0.7	0.7	0.7	0.7
Set up signal level (Vp-p)	—	—	—	—

Factory adjustment timing (2/2)

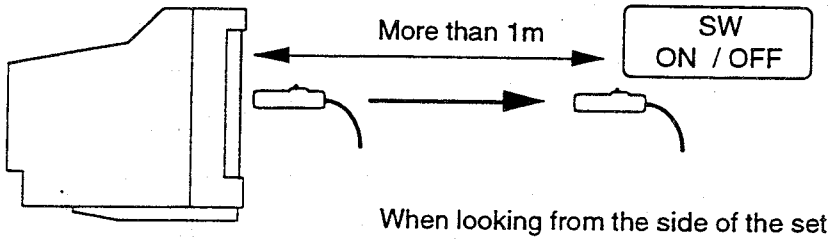
Timing No.	E	F		
Timing outline Resolution Timing name	88kHz/82Hz	104kHz/82Hz		
Dot clock	160.55 MHz	173.44 MHz		
Horizontal period (Th) (Horizontal frequency) (dots)	110360 μsec (88.03 kHz)	9.600 μsec (104.17 kHz)		
Horizontal sync pulse(Tsh) (dots)	1.000 μsec	1.000 μsec		
Horizontal front porch (Tfh) (dots)	0.019 μsec	0.020 μsec		
Horizontal back porch(Tbh) (dots)	1.400 μsec	1.200 μsec		
Horizontal image screen (dots)	8.700 μsec	7.380 μsec		
Vertical period (Tv) (Vertical frequency) (lines)	12.130 msec (82.44 Hz)	12.130 msec (82.44 Hz)		
Vertical sync pulse (Tsv) (lines)	0.034 msec	0.034 msec		
Vertical front porch (Tfv) (lines)	0.038 msec	0.038 msec		
Vertical back porch (Tbv) (lines)	0.388 msec	0.388 msec		
Vertical image screen(Tcv) (lines)	11.670 msec	11.670 msec		
Sync signal input	Separate sync H : POSI V : POSI	Separate sync H : NEG V : NEG		
Video signal level (Vp-p)	0.7	0.7		
Set up signal level (Vp-p)	—	—		

3.10 Reference

3.10.1 How to degauss

(1) For using the handy demagnetyzer, leave more than 1m from the CRT surface when powering the de gauss switch ON or OFF.

(2) For the CRT surface, side, and back, degauss as carefully and slowly as possible. When keeping finally the handy demagnetyzer coil at a distance from the CRT surface, work as slowly as possible, as shown below. When keeping quickly it at a distance, the stripes remains at the corner on the screen.

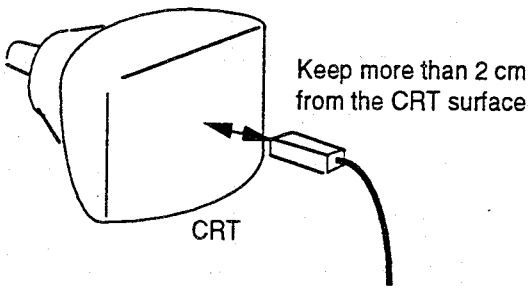


When looking from the side of the set

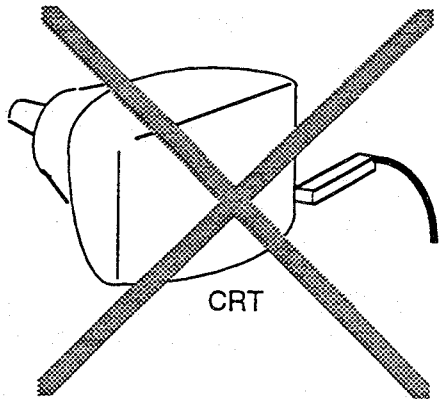
* Pull the handy demagnetyzer slowly (about 1m/3 seconds) from the center of the CRT surface.

<How to have the handy demagnetyzer>

Turn the axial-direction of the handy demagnetyzer to the vertical to the CRT.

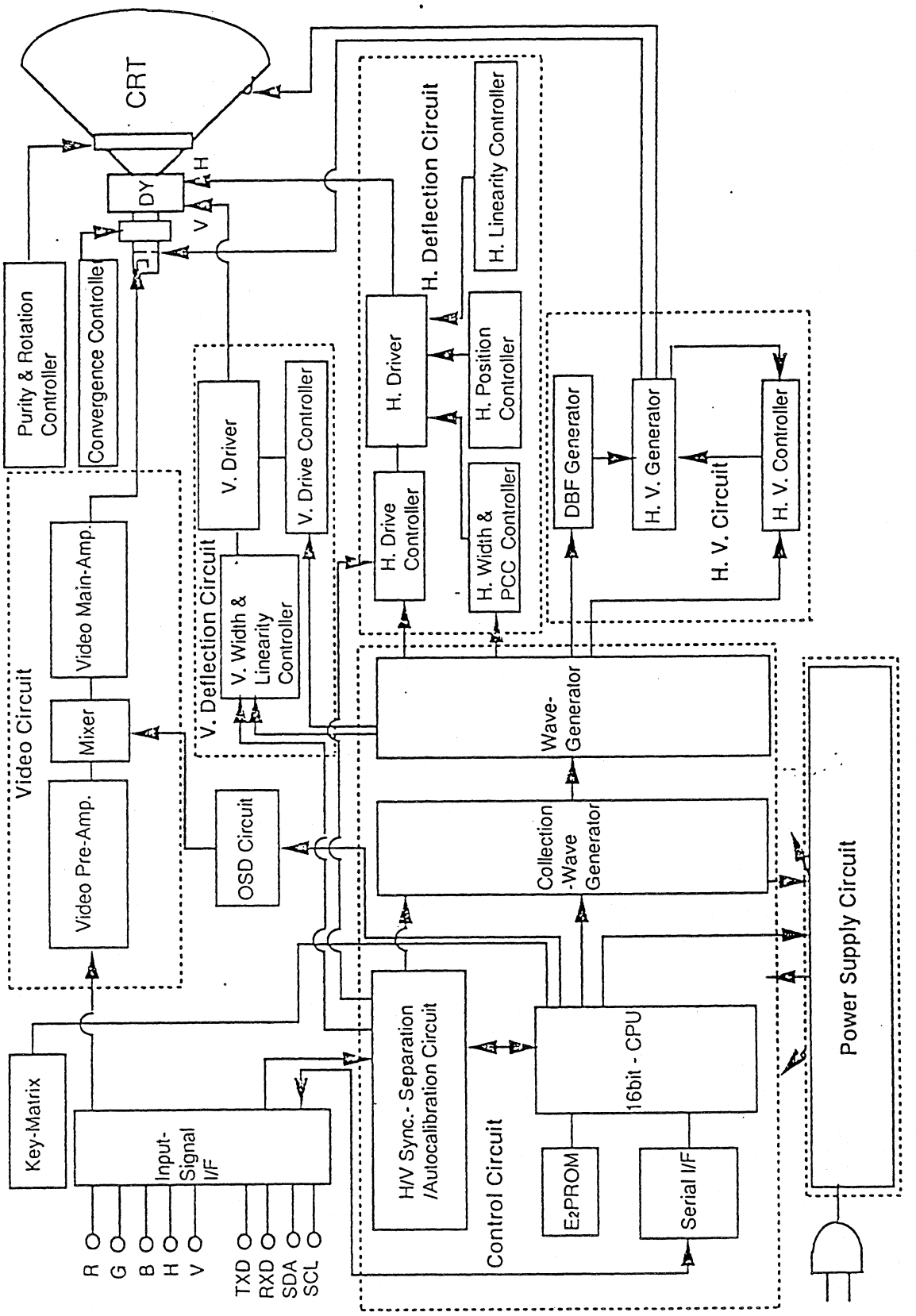


Do not turn the axial-direction of the handy demagnetyzer to the parallel to the CRT.



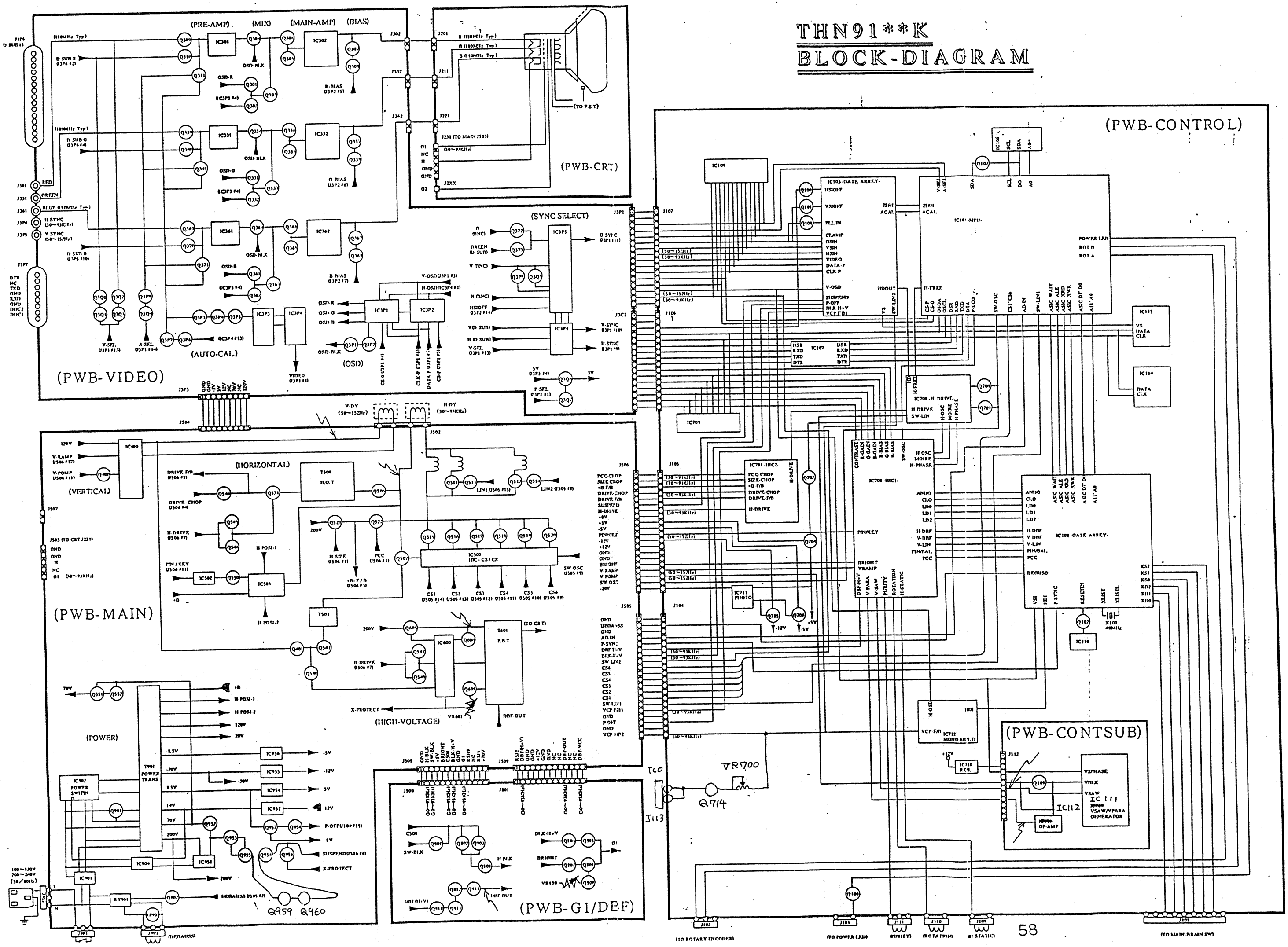
3.10.2 Reference

N chassis control software outline specification



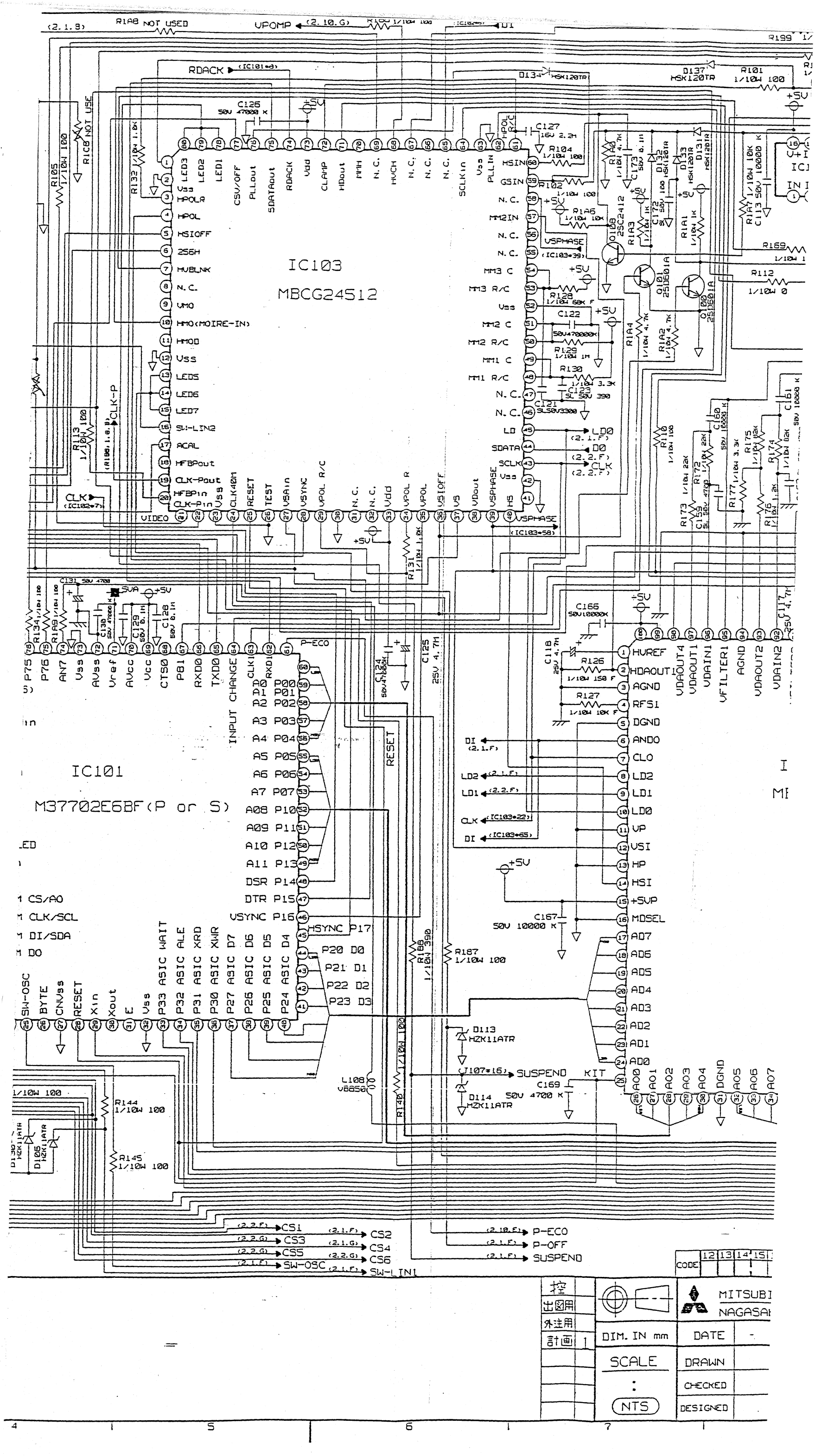
N - Chassis Block Diagram

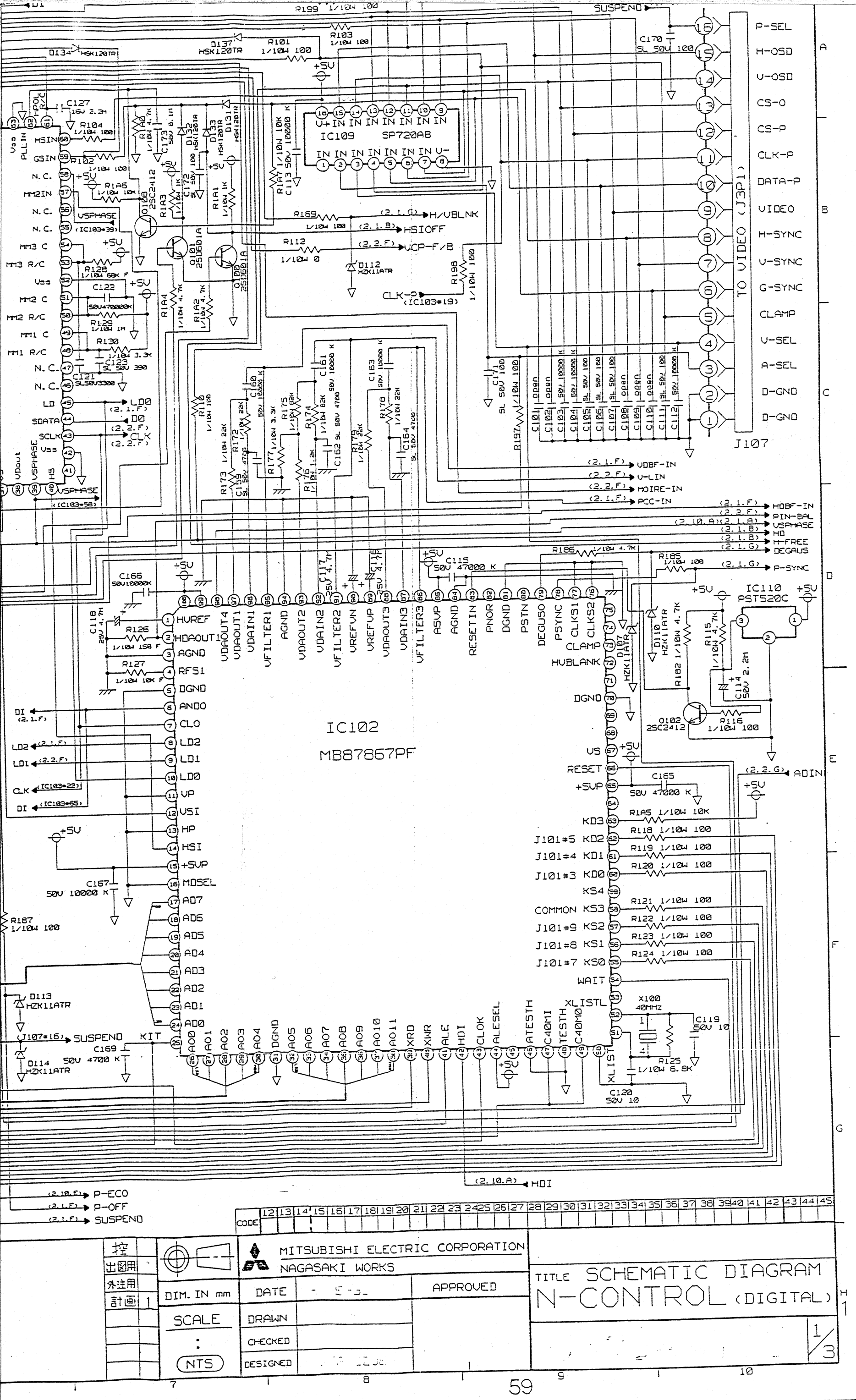
THN91**K
BLOCK-DIAGRAM

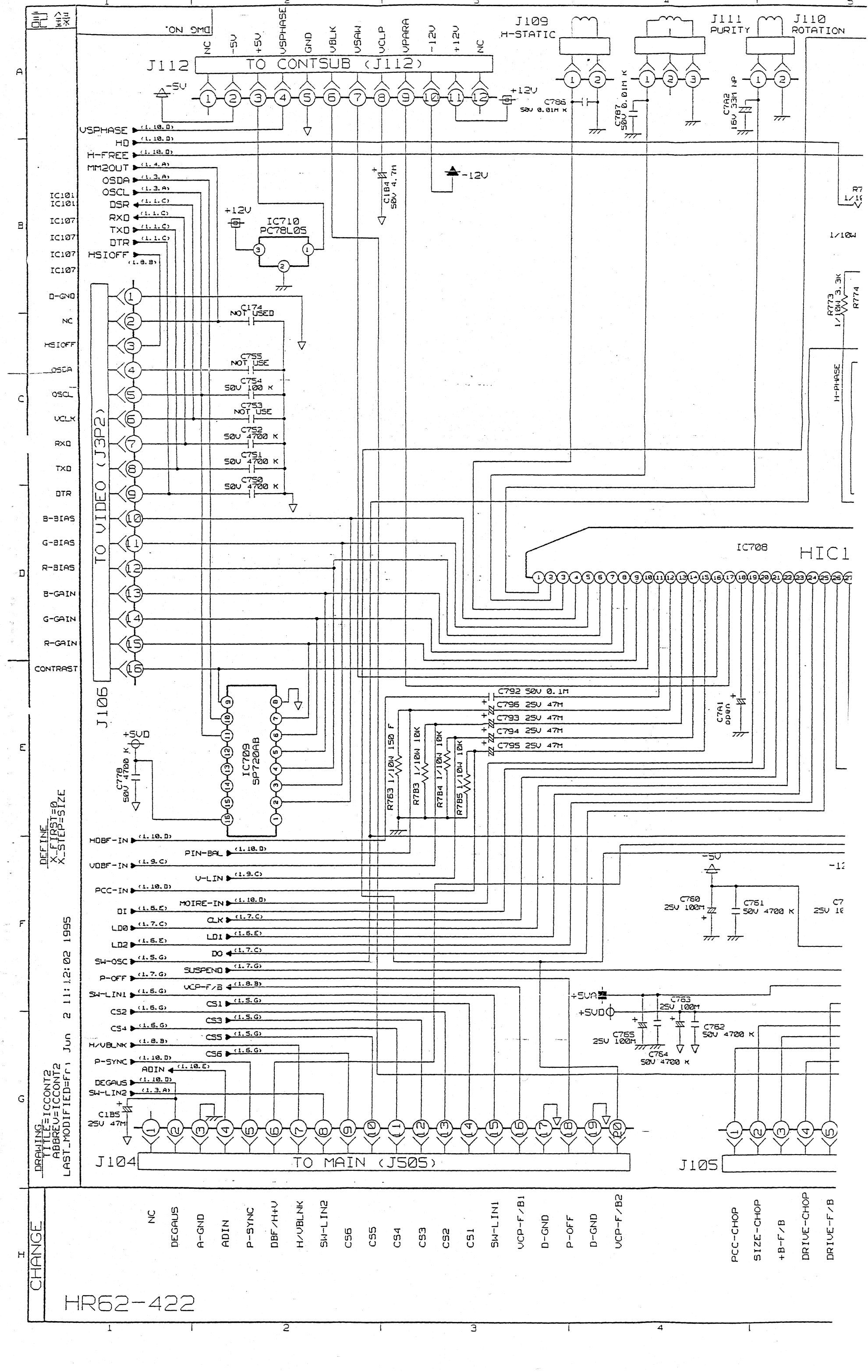


DDC PARTS LIST

	基板1 基板2 基板3 基板5	基板4
IC113	24LC21	OPEN
R150	1/8W 47K	OPEN
R152	1/10W 47K	OPEN
R158	1/10W 100	OPEN
R183	1/10W 100	OPEN
R184	1/10W 100	OPEN
R1C8	1/10W 0	OPEN
C1B3	50V 0.01M	OPEN
C7S4	50V 100	OPEN
D108	HZK11ATR	OPEN
D109	HZK11ATR	OPEN


IC103
MBCG24512
IC101
M37702E6BF(P or S)
R1A8 NOT USED
R1C8 NOT USE
VPOMP
RDACK
VSPHASE
CLK-P
VIDEO
RESET
INPUT CHANGE
P-ECO
SUSPEND
KIT
CS1
CS2
CS3
CS4
CS5
CS6
SW-OSC
SW-LIN1
LD0
D0
CLK
DI
VP
VSI
HP
HSI
MDSEL
AD0
AD1
AD2
AD3
AD4
AD5
AD6
AD7
MITSUBI
NAGASAI
DIM. IN mm
SCALE
NTS
DATE
DRAWN
CHECKED
DESIGNED


IC102
MB87867PF
IC109 SP720AB
IC110 PST520C
TO VIDEO (J3P1)
J107
P-SEL
H-OSD
V-OSD
CS-O
CS-P
CLK-P
DATA-P
VIDEO
H-SYNC
V-SYNC
G-SYNC
CLAMP
V-SEL
A-SEL
D-GND
D-GND
SUSPEND
H/VBLNK
HSIOFF
VCP-F/B
CLK-O
VDBF-IN
V-LIN
MOIRE-IN
PCC-IN
HOBF-IN
PIN-BAL
VSPHASE
HD
H-FREE
DEGAUS
P-SYNC
ADIN
HDI
P-ECO
P-OFF
SUSPEND
MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS
TITLE SCHEMATIC DIAGRAM
N-CONTROL (DIGITAL)
DIM. IN mm
SCALE
NTS
DATE
DRAWN
CHECKED
DESIGNED
APPROVED
1/3


J112
TO CONTSUB (J112)
NC
-5V
+5V
VSPHASE
GND
VBLK
VSAW
VCLP
VPARA
-12V
+12V
NC
J109
H-STATIC
J111
PURITY
J110
ROTATION
C786
50V 0.01M K
C787
50V 0.01M K
C7A2
16V 33M MP
VSPHASE
HD
H-FREE
MM2OUT
OSDA
OSCL
DSR
RXD
TXD
DTR
HSIOFF
IC101
IC107
C184
50V 4.7M
IC710
PC78L05
D-GND
NC
HSIOFF
OSDA
OSCL
VCLK
RXD
TXD
DTR
B-BIAS
G-BIAS
R-BIAS
B-GAIN
G-GAIN
R-GAIN
CONTRAST
J106
TO VIDEO (J3P2)
C174
NOT USED
C755
NOT USE
C754
50V 100 K
C753
NOT USE
C752
50V 4700 K
C751
50V 4700 K
C750
50V 4700 K
R773
1/10W 3.3K
R774
H-PHASE
IC708
HIC1
C792 50V 0.1M
C796 25V 47M
C793 25V 47M
C794 25V 47M
C795 25V 47M
C7A1
open
C778
50V 4700 K
IC709
SP720AB
R763 1/10W 150 F
R783 1/10W 10K
R784 1/10W 10K
R785 1/10W 10K
HOBF-IN
PIN-BAL
VOBF-IN
V-LIN
PCC-IN
MOIRE-IN
DI
CLK
LD0
LD1
LD2
DO
SW-OSC
SUSPEND
P-OFF
VCP-F/B
SW-LIN1
CS1
CS2
CS3
CS4
CS5
CS6
H/VBLNK
P-SYNC
ADIN
DEGAUS
SW-LIN2
C185
25V 47M
C760
25V 100M
C761
50V 4700 K
C763
25V 100M
C762
50V 4700 K
C765
25V 100M
C764
50V 4700 K
J104
TO MAIN (J505)
J105
DEFINE
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ABBREV=ICCONT2
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DEGAUS
A-GND
ADIN
P-SYNC
DBF/H+V
H/VBLNK
SW-LIN2
CS6
CS5
CS4
CS3
CS2
CS1
SW-LIN1
VCP-F/B1
D-GND
P-OFF
D-GND
VCP-F/B2
PCC-CHOP
SIZE-CHOP
+B-F/B
DRIVE-CHOP
DRIVE-F/B
HR62-422

J111 PURITY
J110 ROTATION
C7A2 16V 33M NP
R721 1/4W 4.7K
C781 open
D700 HZK5BTR
R719 1/10W 100
C716 CH 50V 150
C717 SL 50V 3300
R720 1/10W 22K
IC700 LA7860 (DIP)
R700 1/10W 4.7K
R701 1/10W 4.7K
C700 50V 0.01M K
C701 CH 50V 560
R702 1/10W 22K F
C703 CH 50V 1000 G
C704 25V 4.7M
R705 1/10W 1.8K F
C708 50V 0.001M K
C709 50V 1000 G
C711 CH 50V 470
C715 50V 0.01M K
R717 1/10W 10K F
R773 1/10W 3.3K
R774 1/10W 3.3K
C785 50V 0.01M K
R705 1/10W 10K
C705 CH 50V 180 G
Q700 2SD601A
R710 1/10W 3.3K
R710 NOT USED
C710 CH
Q701 2SD601A
R724 1/10W 1.5K
HD-OUT
R706 1/10W 10K
R707 1/10W 330
C706 50V 2.2M
C707 50V 2.2M
R716 1/8W 1K F
H-PHASE
C702 50V 0.01M
R703 1/10W 3.3K F
R704 1/10W 56K
C780 50V 1000 K
R708 1/10W 10K F
C795 25V 47M
L700 1000M K
C712 50V 0.01M K
C714 25V 100M
R714 1/8W 12
R713 1/8W 12
R715 1/8W 12
C713 25V 100M
C779 25V 4.7M NP
R712 1/10W 4.7K F
MOIRE
+12V
C731 25V 47M
C730 50V 4700 K
-12V
C776 25V 47M
C733 50V 4700 K
+5V
R775 1/10W 10K F
C798 50V 220
C797 open
IC712 74LS221
C7A3 NOT USE
R1C1 1/10W 0
IC708 HIC1
DRIVE/DA
HI-OSC-MAIN
DBF/H+V
SW-OSC
BRIGHT
+5VA
-5V
-12V
+12V
C770 50V 4700 K
C771 50V 4700 K
C772 25V 47M
C773 50V 4700 K
C774 50V 4700 K
C775 25V 47M
C7A1 open
Q704 2SB1001
R767 1/10W 1K
R768 1/10W 1K
R782 1/10W 390 F
R779 1/10W 3.3K F
R780 1/10W 3.3K F
R781 1/10W 750 F
C783 WSR 200V 0.01M
D702 EGP10D
D705
Q706 2SB1001
Q705 2SB1001
R771 1/10W 1K
R772 1/4W 1K
R769 1/10W 1K
R770 1/10W 1K
IC711 TL
-5V
C760 25V 100M
C761 50V 4700 K
-12V
C758 25V 100M
C759 50V 4700 K
+12V
C756 25V 100M
C757 50V 4700 K
C763 25V 100M
C762 50V 4700 K
C764 50V 4700 K
C7A0 SL 50V 100
CR
-20V
J105
TO MAIN (J506)

1	PCC-CHOP
2	SIZE-CHOP
3	+B-F/B
4	DRIVE-CHOP
5	DRIVE-F/B
6	SUSPEND
7	H-DRIVE
8	+8V
9	+5V
10	-5V
11	PIN/KEY
12	-12V
13	+12V
14	A-GND
15	A-GND
16	BRIGHT
17	VRAMP
18	VPUMP

CODE 12 13 14 15 16 17 18 19 20 21 22 23 24

MITSUBISHI ELECTRIC CORPO
NAGASAKI WORKS

DIM. IN mm	DATE	APPROV
SCALE : NTS	DRAWN	
	CHECKED	
	DESIGNED	

+12V
+5V
R775 1/10W 10K F
C797 open
C798 50V 220
IC712 74LS221
R777 NOT USE
C7A3 NOT USE
(1.10.D) VSPHASE
(1.9.G) HDI
(1.9.A) H-OSD
R724 NOT USE
C781 open
D700 HZK5BTR
R719 1/10W 100
(DIP)
C711 CH 50V 470
C715 50V 0.01M K
R717 1/10W 10K F
Q701 2SD601A
R724 1/10W 1.5K
HD-OUT
IC701 HIC2
R716 1/8W 1K F
2.2M
C712 50V 0.01M
C714 25V 100M
R714 1/8W 12
R713 1/8W 12
R715 1/8W 12
C713 25V 100M
C728 25V 100M
C727 50V 2.2M
C731 25V 47M
C730 50V 4700 K
C735 25V 22M
-12V
C776 25V 47M
C733 50V 4700 K
R750 1/10W 5.6K
C734 25V 10M
H-SIZE-PCC
DRIVE/DA
H-DRIVE
DRIVE-CHOP
+B-F/B
SIZE-CHOP
PCC-CHOP
DRIVE-F/B
MOIRE
R1C1 1/10W 0
IVE/DA
2V
774 0V 4700 K
+12V
773 0V 4700 K
K
Q704 2SB1001
R767 1/10W 1K
R768 1/10W 1K
R782 1/10W 390 F
R783 1/10W 330 F
D703 HSK120
R785 1/4W 100 K
Q714 2SC2274
C782 WSR 200V 0.01M
R779 1/10W 3.3K F
R780 1/10W 3.3K F
C783 WSR 200V 0.01M
D702 EGP10D
R781 1/10W 750 F
D705 HSK120
D704 HSK120
R784 1/10W 270 F
AG700 DSP201M
J113 2P
Q702 2SD601A
R761 1/10W 4.7K
P-ECO (1.7.G)
Q706 2SB1001
Q705 2SB1001
R771 1/10W 1K
R772 1/4W 1K
R769 1/10W 1K
R770 1/10W 1K
R762 1/10W 15K
IC711 TLP124
R760 1/10W 1.8K
VPOMP (1.5.A)
(1.3.F) CR
CR
-20V
A-GND
BRIGHT
VRAMP
VPOMP
CODE
MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS
DIM. IN mm
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CHECKED
DESIGNED
APPROVED
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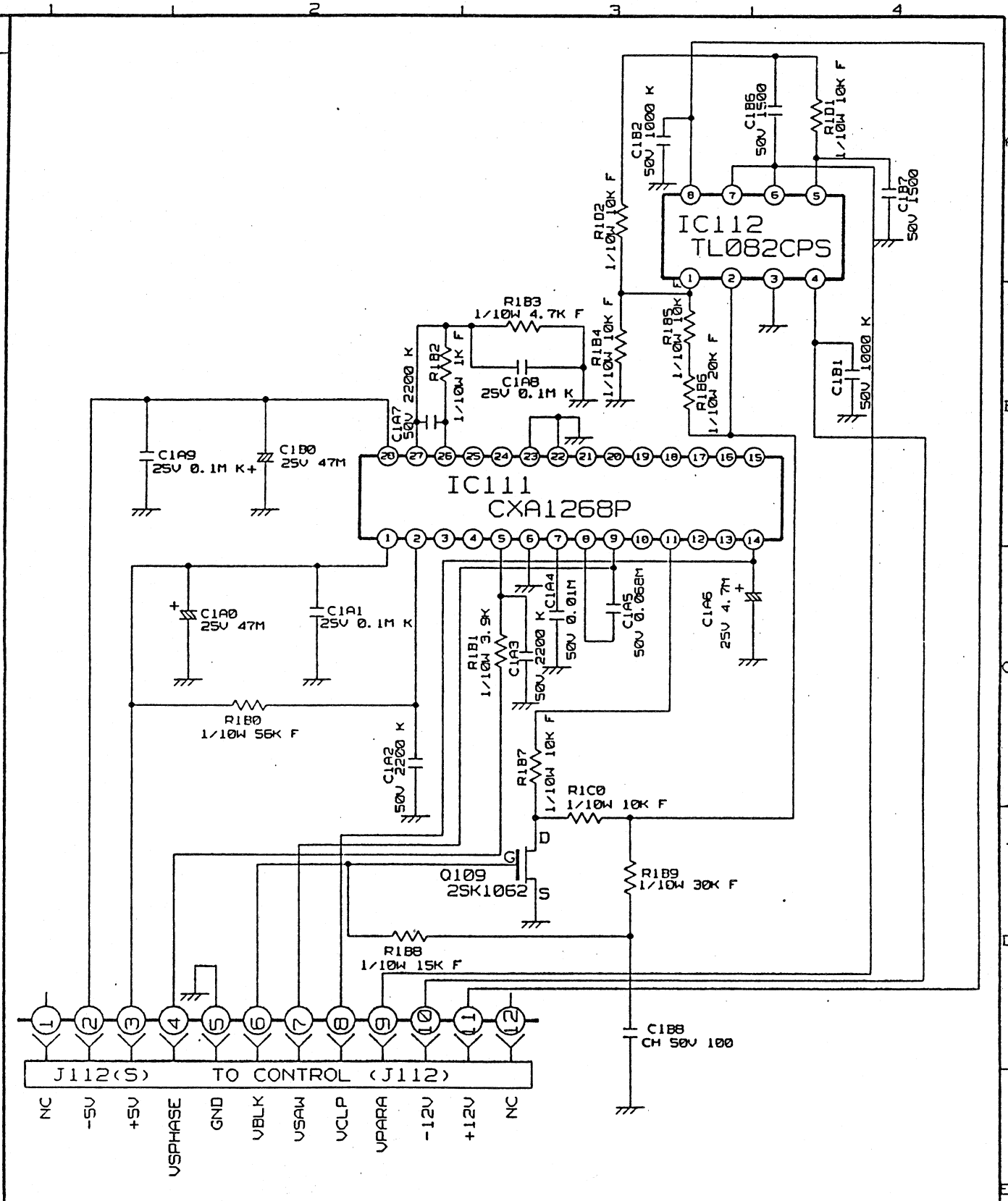
N-CONTROL (ANALOG)
2/3
60



CHANGE

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LAST_MODIFIED=Wed May 31 17:01:18 1995

HR62-422

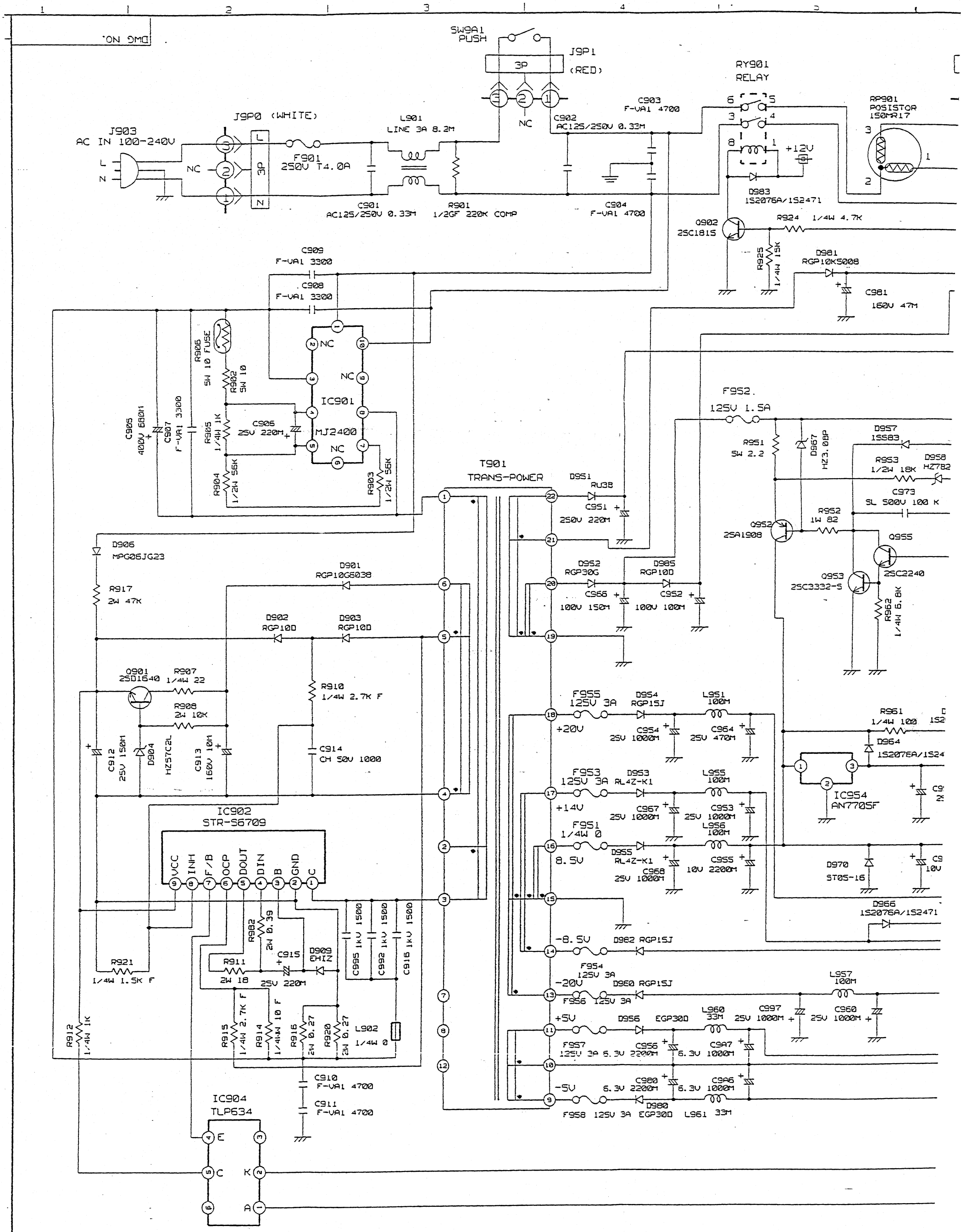
CODE

MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS

TITLE SCHEMATIC DIAGRAM
N-CONTROL-SUB

DIM. IN mm	DRAWN		APPROVED
SCALE NTS :	CHECKED		
DATE	DESIGNED		61

3/3



HR62-422

DRAWING

TITLE=NMAIN
ABBREV=NMAIN

LAST_MODIFIED=Wed May 31 15:25:48 1995

CHANGE

DEGAUS J9P2 (BLUE)

RP901
POSISTOR
150M-R17

RV900
VARISTOR
20DK151

TO VIDEO (J3P3) J504

GND GND -5V +5V +12V NC 70V NC +120V

R975 2W 10K

(1.10.C) DEGAUS

(1.1.A) +120V

(1.1.B) +70V

(1.1.B) 200V

C981
160V 47M

L953
100M

R976
1/4W 11K F

C977
250V 22M

R977
1/4W 10K F

D957
1SS83

IC951
SE140N

R953
1/2W 18K

D958
HZ782

C973
SL 500V 100 K

C994
50V 0.01M

Q955
2SC2240

R962
1/4W 6.8K

R986
1/4W 5.8K

R985
1/2W 27K

Q959
2SC2240

Q960
2SC1815

+5V

R988
1/4W 56K

R987
1/4W 1K

R989
1/4W 1K

C9A3
10V 47M

Q954
2SC1815

R955
1/4W 10K

R964
1/4W 22K

Q956
SF0R3G42

R967
1/4W 100

C978
50V 0.01M K

C962
6.3V 470M

R966
1/4W 1K

R965
1/4W 10K

(1.1.G) SUSPEND

(1.1.G) PROTECT

R961
1/4W 100

D964
1S2076A/1S2471

D964
1S2076A/1S2471

C957
25V 47M

Q957 2SA1020

R968
1/4W 1K

R959
1/4W 470

Q958
2SC1815

R971
1/4W 15K

R970
1/4W 4.7K

C9A4
10V 2200M

(1.1.G) +5V

(1.1.G) +8V

(1.10.F) P-OFF

(1.1.A) +20V

D966
1S2076A/1S2471

R954
1/4W 1.5K

(1.1.A) +14V

(1.1.G) +12V

IC952
AN7712F

C958
25V 47M

IC955
AN79N12

C961
25V 47M

IC956
AN790SF

C993
25V 470M

C965
25V 47M

(1.1.G) -12V

(1.1.G) -5V

(1.1.A) -20V

(1.1.E) +B

(1.1.E) H-POSI1

(1.1.E) H-POSI2

CODE 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

控 / 比図用 / 外注用 / 計画 1	MITSUBISHI ELECTRIC CORPORATION NAGASAKI WORKS		
DIM. IN mm	DATE		APPROVED
SCALE : NTS	DRAWN		
	CHECKED		
	DESIGNED		

TITLE SCHEMATIC DIAGRAM
N-MAIN (POWER)
2/2

DWG NO.

HR62-422

	信号1	信号2	信号3	信号4
R3A1	1/10W 68			1/10W 120
R3E1	1/10W 68			1/10W 120
R3J1	1/10W 68			1/10W 120
R3A0	1/10W 27			1/10W 39
R3J0	1/10W 27			1/10W 39
L303	SHORT			VB850
L333	SHORT			VB850
L363	SHORT			VB850

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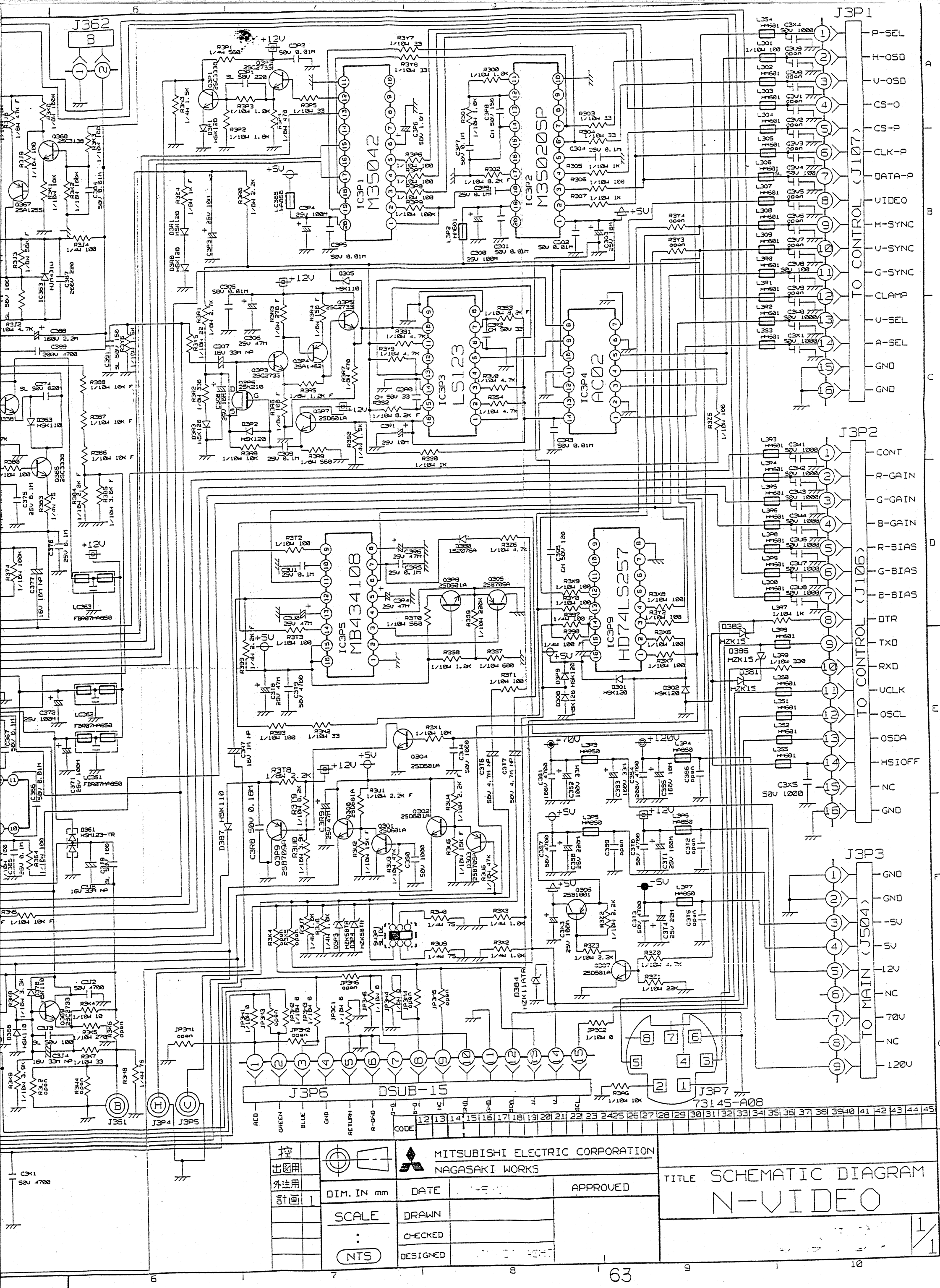
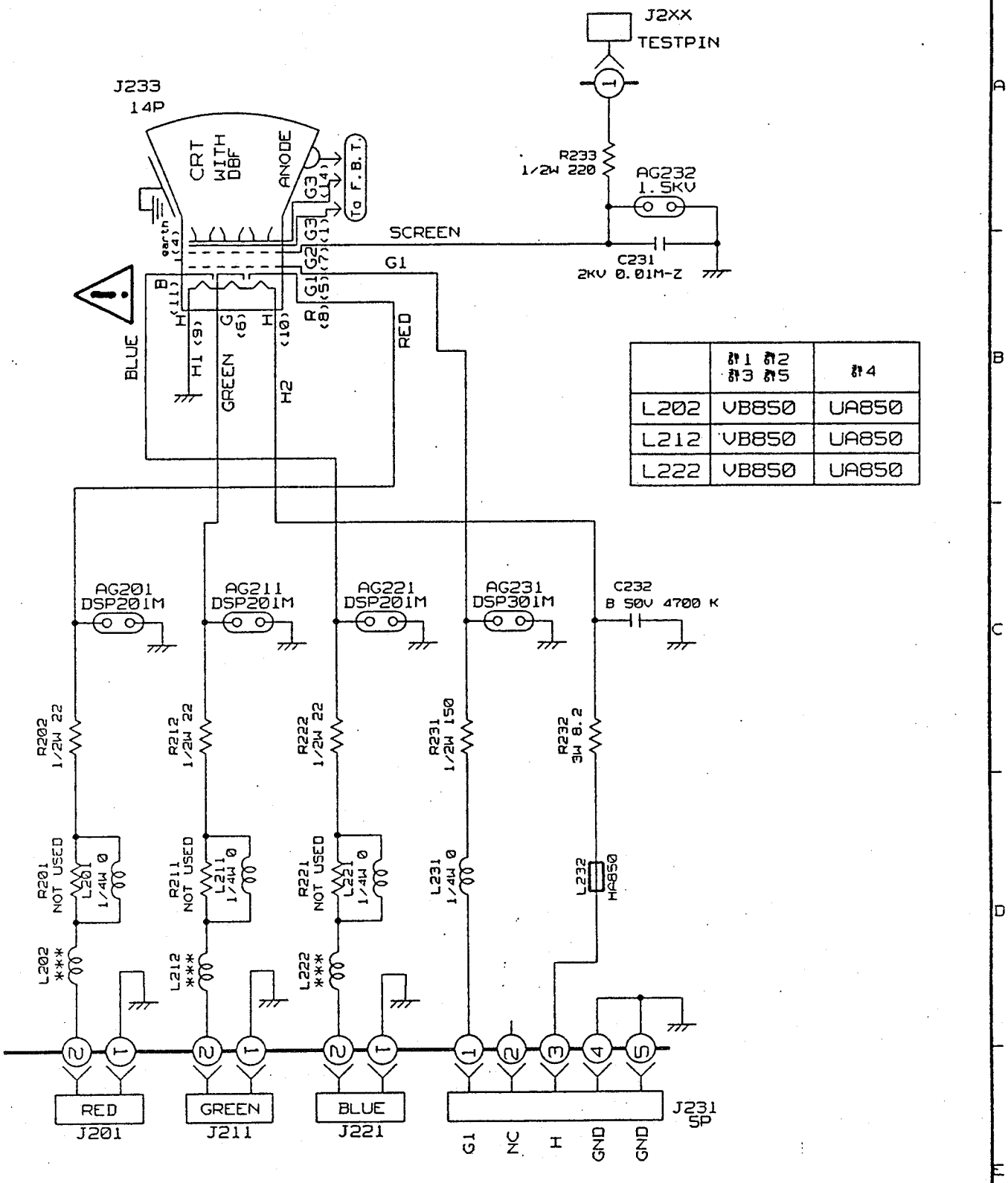

J362
B
+12V
+5V
IC3P1 M35042
IC3P2 M35020SP
IC3P3 LS123
IC3P4 AC02
IC3P5 MB434108
IC3P9 HD74LS257
J3P1
P-SEL
H-OSD
V-OSD
CS-O
CS-P
CLK-P
DATA-P
VIDEO
H-SYNC
V-SYNC
G-SYNC
CLAMP
V-SEL
A-SEL
GND
GND
TO CONTROL (J107)
J3P2
CONT
R-GAIN
G-GAIN
B-GAIN
R-BIAS
G-BIAS
B-BIAS
DTR
TXD
RXD
VCLK
OSCL
OSDA
HSIOFF
NC
GND
TO MAIN (J504)
GND
-5V
5V
12V
NC
70V
NC
120V
J3P3
J3P6 DSUB-15
RED
GREEN
BLUE
GND
RETURN
R-GND
CODE
J3P7
73145-A08
J361
J3P4
J3P5
MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS
TITLE SCHEMATIC DIAGRAM
N-VIDEO
DIM. IN mm
SCALE
NTS
DATE
DRAWN
CHECKED
DESIGNED
APPROVED
1/1



	1 2 3 5	4
L202	VB850	UA850
L212	VB850	UA850
L222	VB850	UA850

CHANGE

DRAWING
TITLE=NCRT
ABBREV=NCRT

HR62-422

DEFINE
X_FIRST=0
X_STEP=SIZE

COMPNENTS MARKED BY ⚠ HAS SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY

LAST_MODIFIED=Fri Jun 2 11:32:27 1995

CODE 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS

THN9105
SCHEMATIC-DIAGRAM
N-CHASSIS PCB-CRT
(ND21 MITSUBISHI)

DIM. IN mm	DRAWN		APPROVED
SCALE NTS :	CHECKED		
DATE	DESIGNED		64

DWG NO.

IC400 STK792-110

J507 2P

IC503 TDA 2040V

IC505 TL431

IC502 TL082

TS00 TRANS7

TS01 TRANS8

IC600 HIC-SR

J508
GND
H-BLK
SW-BLK
+5V
BRIGHT
CS
BLK-H+C
GND(BLK
G1
RSH9
NC
NC
+70V

TO G1/DBF(J800)

J503
GND
GND
+8V
NC
G1

TO CRT (J231)

+14V (2.10.F)
-20V (2.10.G)
+120V (2.10.B)
+20V (2.10.F)
+200V (2.10.B)
+70V (2.10.B)
+8 (2.10.G)
H-POSI1 (2.10.G)
H-POSI2 (2.10.G)
SUSPEND (2.10.D)
+8V (2.10.E)
+5V (2.10.E)
PROTECT (2.10.D)
+12V (2.10.F)
-12V (2.10.F)
-5V (2.10.G)

J509 TO MAIN(DBF J801)
NC
DBF(H+V)
GND(DBF)
GND(DBF)
+12V
GND(DBF)
GND(DBF)
NC
NC
DBF-OUT
NC
NC
DBF-Vcc

J506 TO CONTROL (J105)
-20V
CR
V-POMP
V-RAMP
BRIGHT
GND
GND
+12V
-12V
PIN/KEY
-5V
+5V
+8V
H-DRIVE
SUSPEND
DRIVE-F/B
DRIVE-CHOP
+B-F/B
SIZE-CHOP

CHANGE

HR62-422

DEFINE
X_FIRST=0
X_STEP=SIZE

DRAWING
TITLE=NMAIN
ABBREV=NMAIN

LAST_MODIFIED=Fri Jun 2 17:28:54 1995

ITEM / PARTS	ﾀｲﾌﾟ1 ﾀｲﾌﾟ2 ﾀｲﾌﾟ3 ﾀｲﾌﾟ5	ﾀｲﾌﾟ4
L506	LME023	HL25
L508	560M	330M
L509	100M	150M
C521	0.22M	0.18M

番号	型名
1	THN910SK(OWN)
2	THN911SK(MIRO)
3	THN918SK(DELL)
4	THN917SK(RADIUS)
5	THN912SK(GATEWAY)

CODE 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

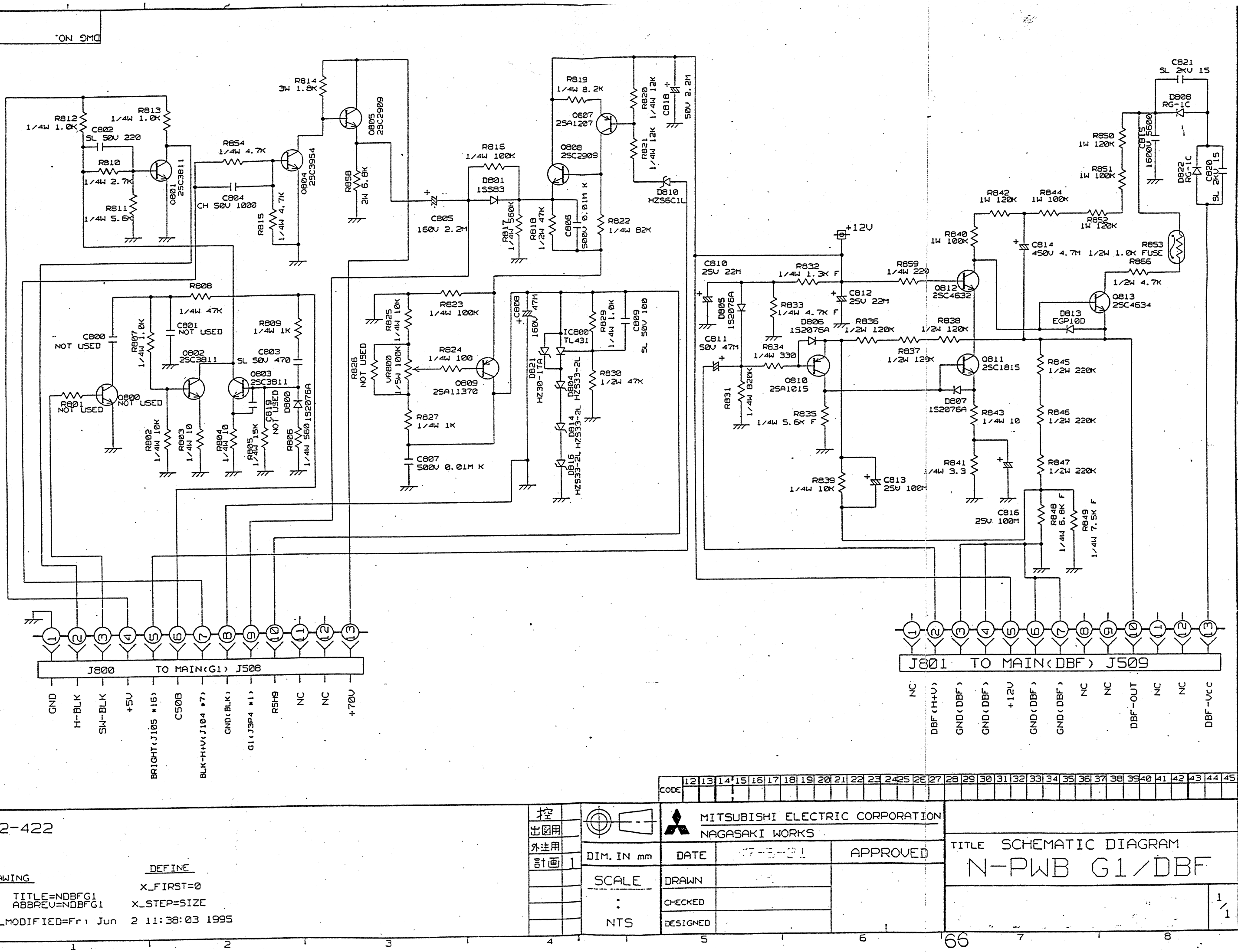
MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS

TITLE SCHEMATIC DIAGRAM
N-MAIN (DEFL)

1/2

DIM. IN mm | SCALE : NTS | DATE | DRAWN | CHECKED | DESIGNED | APPROVED

65



CHANGE

HR62-422

DRAWING

TITLE=NDBFG1
ABBREV=NDBFG1
LAST_MODIFIED=Fri Jun 2 11:38:03 1995

DEFINE

X_FIRST=0
X_STEP=SIZE

控
出図用
外注用
計画 1

DIM. IN mm
SCALE : NTS

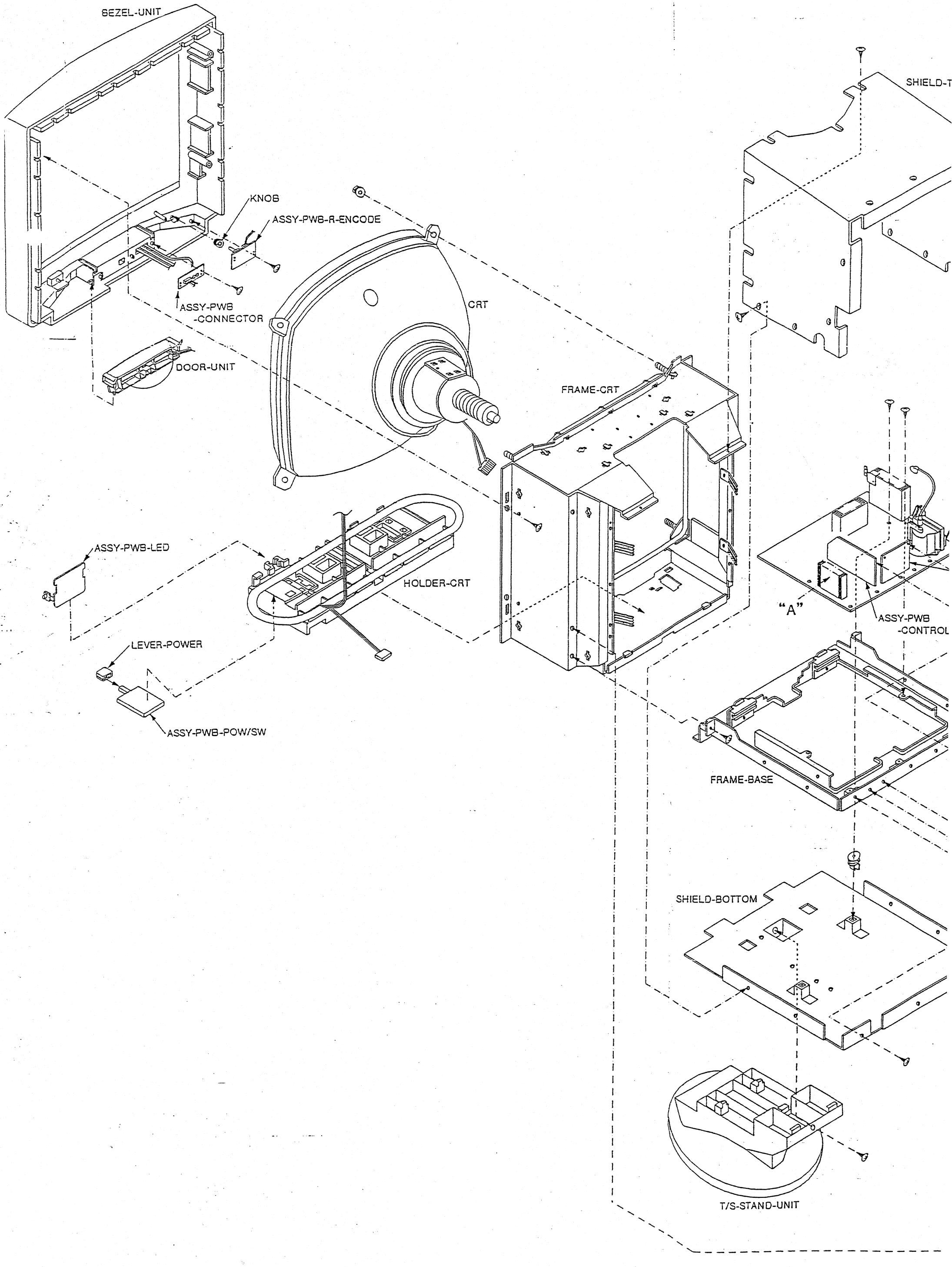
MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS

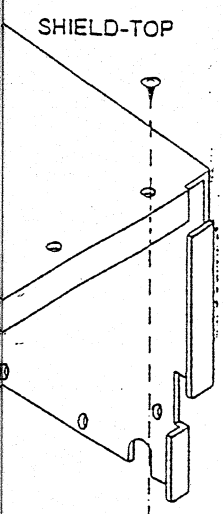
	DATE	APPROVED
DRAWN		
CHECKED		
DESIGNED		

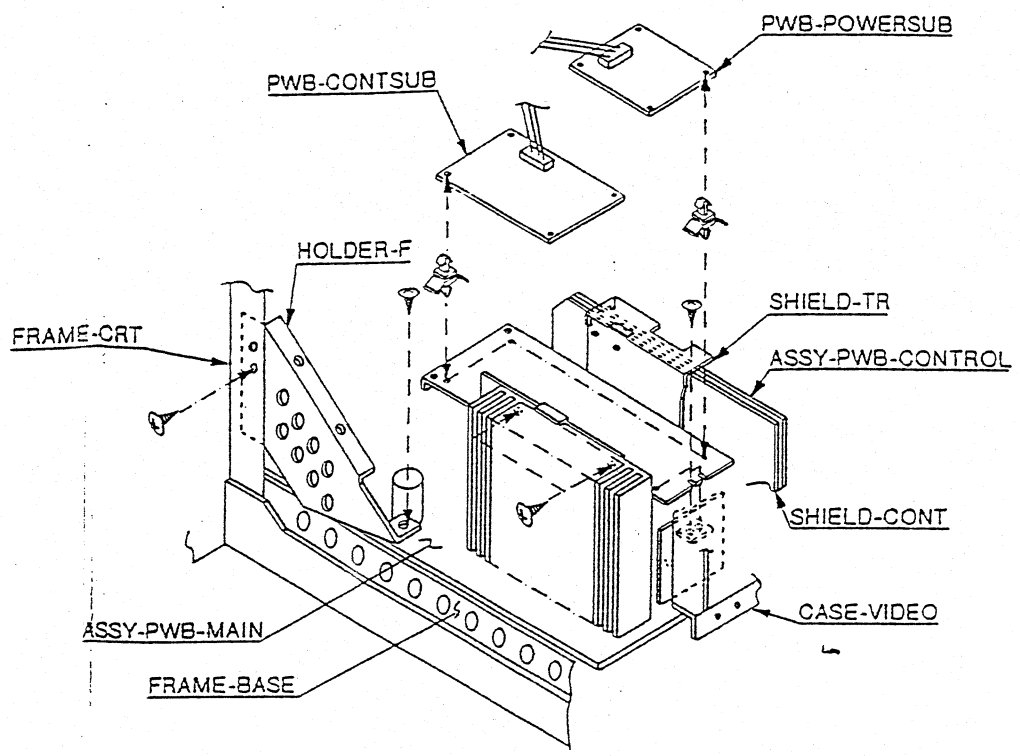
TITLE SCHEMATIC DIAGRAM
N-PWB G1/DBF

1/1

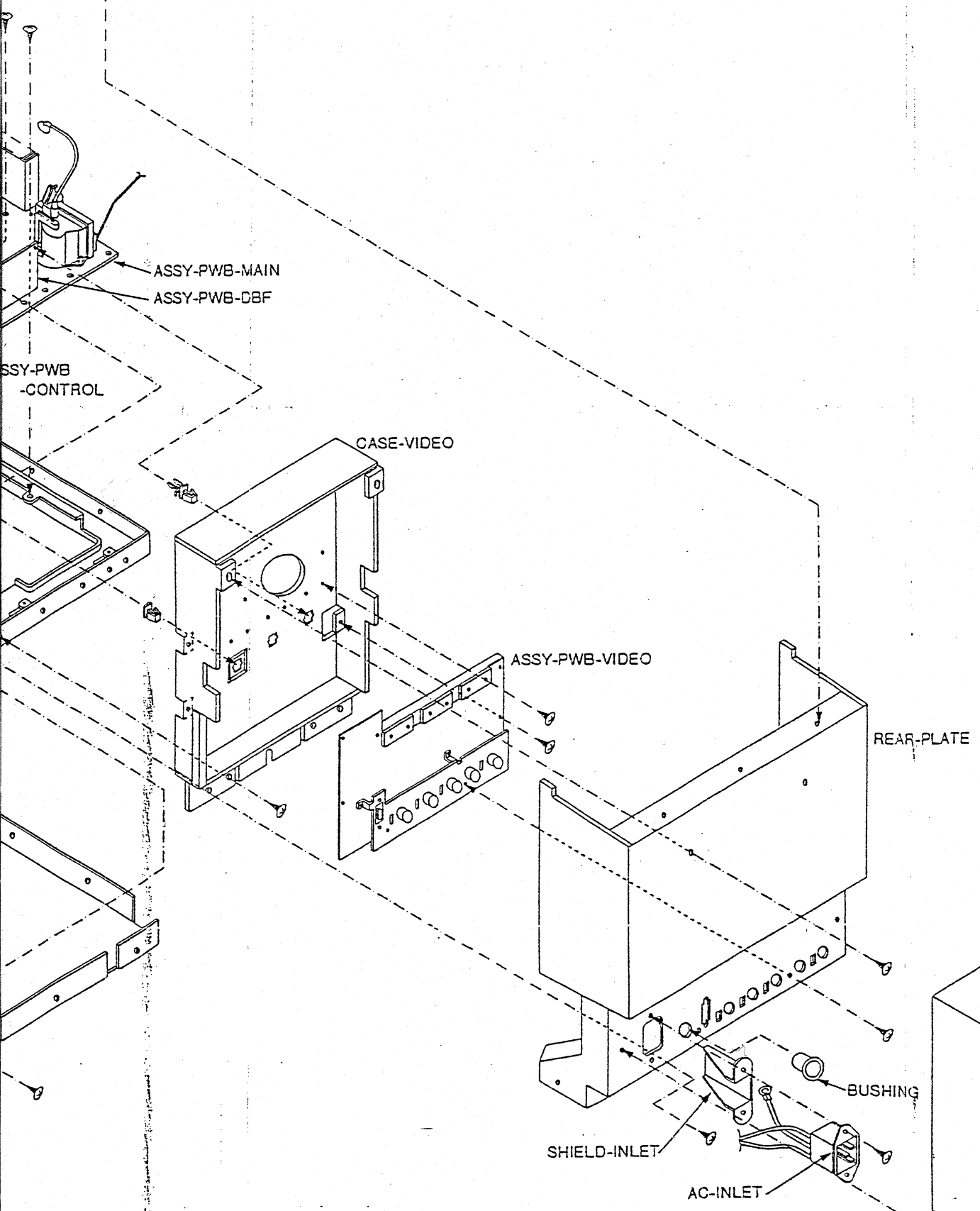
66


BEZEL-UNIT
KNOB
ASSY-PWB-R-ENCODE
ASSY-PWB
-CONNECTOR
DOOR-UNIT
CRT
FRAME-CRT
SHIELD-T
ASSY-PWB-LED
HOLDER-CRT
LEVER-POWER
ASSY-PWB-POW/SW
"A"
ASSY-PWB
-CONTROL
FRAME-BASE
SHIELD-BOTTOM
T/S-STAND-UNIT

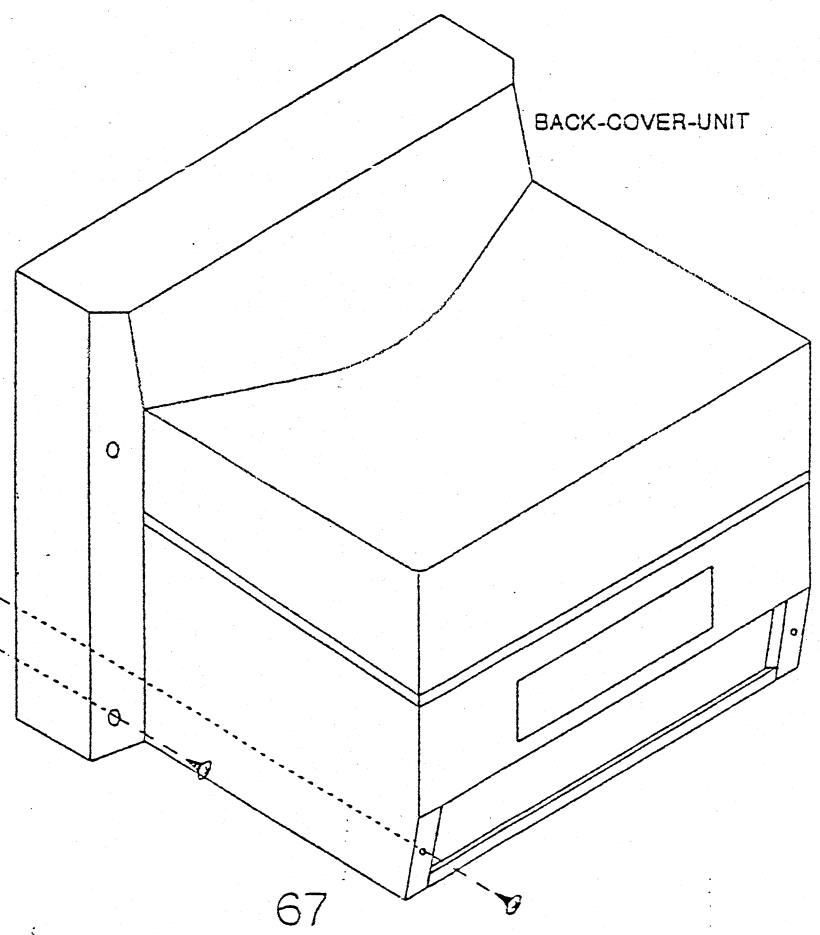




See "A"



5.EXPLODED VIEW
THN series



MODEL NO.:THN9105SKTKL CBB-S6436

ITEM	SYMBOL NO.	DESCRIPTION/SPECIFICATION	PART NO.
1		AC-POWER-CORD PM-1461C	CP242C09901
2		CABLE SC-B101 THN9105SKTK(MI)	CP242C18801
3		ADAPTER AD-A205	CP452P15501
4		DOOR ABS THN9105K (ME)	CP702A00402
5		KNOB-VR ABS THN9105K (ME)	CP703C03801
6		BEZEL-UNIT CP700A108-1 THN9105K (ME)	CP720B03601
7		BACK-COVER-UNIT CP700A109-1 THN9105K (ME)	CP721B04101
8		T/S-STAND-UNIT FR8905K (ME)	CP722B00701
9		PACKING-CASE THN9105SKTK	CP802C13002
10		ACCESSORY THN9105SKTK	CP859C08107
11	CRT	M50KZV21X08(D) ITC	0381C08Z
1	R 914	R-METAL-S 1/4W 100-F	CP103P06205
2	R 5G9	R-METAL-S 1/4W 1K-F 102 RN-H	CP103P06409
3	R 647	R-METAL-S 1/4W 1K-F 102 RN-H	CP103P06409
4	R 832	R-METAL-S 1/4W 1.3K-F 132 RN-H	CP103P06502
5	R 921	R-METAL-S 1/4W 1.5K-F 152 RN-H	CP103P06503
6	R 647	R-METAL-S 1/4W 2K-F 202 RN-H	CP103P06506
7	R 910	R-METAL-S 1/4W 2.7K-F 272 RN-H	CP103P06509
8	R 915	R-METAL-S 1/4W 2.7K-F 272 RN-H	CP103P06509
9	R 654	R-METAL-S 1/4W 4.3K-F 432 RN-H	CP103P06604
10	R 721	R-METAL-S 1/4W 4.7K-F 472RN-H	CP103P06605
11	R 833	R-METAL-S 1/4W 4.7K-F 472RN-H	CP103P06605
12	R 835	R-METAL-S 1/4W 5.6K-F 562 RN-H	CP103P06607
13	R 848	R-METAL-S 1/4W 6.8K-F 682 RN-H	CP103P06609
14		R-METAL-S 1/4W 7.5K-F	CP103P06700
15	R 5H4	R-METAL-S 1/4W 7.5K-F	CP103P06700
16	R 849	R-METAL-S 1/4W 7.5K-F	CP103P06700
17	R 977	R-METAL-S 1/4W 10K-F 103 RN-H	CP103P06703
18	R 976	R-METAL-S 1/4W 11K-F 113 RN-H	CP103P06704
19	R 578	R-METAL-S 1/4W 12K-F 123 RN-H	CP103P06705
20	R 579	R-METAL-S 1/4W 12K-F 123 RN-H	CP103P06705
21	R 576	R-METAL-S 1/4W 15K-F 153 RN-H	CP103P06707
22	R 577	R-METAL-S 1/4W 15K-F 153 RN-H	CP103P06707
23	R 5G5	R-METAL-S 1/4W 18K-F 183 RN-H	CP103P06709
24	R 5E2	R-METAL-S 1/4W 22K-F 223RN-H	CP103P06801
25	R 575	R-METAL-S 1/4W 27K-F 273 RN-H	CP103P06803
26	R 5G7	R-METAL-S 1/4W 33K-F 333RN-H	CP103P06805
27	R 5E0	R-METAL-S 1/4W 39K-F 393 RN-H (DH)	CP103P06807
28	R 5F7	R-METAL-S 1/4W 39K-F 393 RN-H (DH)	CP103P06807
29	R 5H5	R-METAL-S 1/4W 43K-F 433 RN-H	CP103P06808
30	R 5E1	R-METAL-S 1/4W 82K-F 823 RN-H	CP103P06905
31	R 636	R-METAL-S 1/4W 100K-F 104 RN-H	CP103P07001
32	R 3A0	R-CARBON-CHIP 1/10W 27-F	CP103P11009
33	R 3E0	R-CARBON-CHIP 1/10W 27-F	CP103P11009
34	R 3J0	R-CARBON-CHIP 1/10W 27-F	CP103P11009
35	R 361	R-CARBON-CHIP 1/10W 33-F	CP103P11100
36	R 1A8	R-CARBON-CHIP 1/10W 100-F	CP103P11106
37	R 397	R-CARBON-CHIP 1/10W 100-F	CP103P11106
38	R 398	R-CARBON-CHIP 1/10W 100-F	CP103P11106
39	R 126	R-CARBON-CHIP 1/10W 150-F	CP103P11108
40	R 763	R-CARBON-CHIP 1/10W 150-F	CP103P11108
41	R 784	R-CARBON-CHIP 1/10W 270-F	CP103P11201
42	R 783	R-CARBON-CHIP 1/10W 330-F	CP103P11202
43	R 782	R-CARBON-CHIP 1/10W 390-F	CP103P11203
44	R 1B2	R-CARBON-CHIP 1/10W 1.0K-F	CP103P11208
45	R 709	R-CARBON-CHIP 1/10W 1.8K-F	CP103P11301
46	R 3U1	R-CARBON-CHIP 1/10W 2.2K-F	CP103P11302
47	R 3U4	R-CARBON-CHIP 1/10W 2.2K-F	CP103P11302

48	R 307	R-CARBON-CHIP	1/10W 2.2K-F		CP103P11302
49	R 324	R-CARBON-CHIP	1/10W 2.2K-F		CP103P11302
50	R 337	R-CARBON-CHIP	1/10W 2.2K-F		CP103P11302
51	R 354	R-CARBON-CHIP	1/10W 2.2K-F		CP103P11302
52	R 367	R-CARBON-CHIP	1/10W 2.2K-F		CP103P11302
53	R 384	R-CARBON-CHIP	1/10W 2.2K-F		CP103P11302
54	R 399	R-CARBON-CHIP	1/10W 2.2K-F		CP103P11302
55	R 309	R-CARBON-CHIP	1/10W 2.7K-F		CP103P11303
56	R 339	R-CARBON-CHIP	1/10W 2.7K-F		CP103P11303
57	R 369	R-CARBON-CHIP	1/10W 2.7K-F		CP103P11303
58	R 703	R-CARBON-CHIP	1/10W 3.3K-F		CP103P11304
59	R 779	R-CARBON-CHIP	1/10W 3.3K-F		CP103P11304
60	R 780	R-CARBON-CHIP	1/10W 3.3K-F		CP103P11304
61	R 1B3	R-CARBON-CHIP	1/10W 4.7K-F		CP103P11306
62	R 712	R-CARBON-CHIP	1/10W 4.7K-F		CP103P11306
63	R 3N6	R-CARBON-CHIP	1/10W 5.6K-F		CP103P11307
64	R 3Q2	R-CARBON-CHIP	1/10W 8.2K-F		CP103P11309
65	R 3S2	R-CARBON-CHIP	1/10W 8.2K-F		CP103P11309
66	R 3S3	R-CARBON-CHIP	1/10W 8.2K-F		CP103P11309
67	R 1B4	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
68	R 1B5	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
69	R 1B7	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
70	R 1C0	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
71	R 1D1	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
72	R 1D2	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
73	R 127	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
74	R 3N5	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
75	R 310	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
76	R 326	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
77	R 327	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
78	R 328	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
79	R 340	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
80	R 356	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
81	R 357	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
82	R 358	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
83	R 370	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
84	R 386	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
85	R 387	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
86	R 388	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
87	R 708	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
88	R 717	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
89	R 775	R-CARBON-CHIP	1/10W 10K-F		CP103P11400
90	R 1B8	R-CARBON-CHIP	1/10W 15K-F		CP103P11402
91	R 3U2	R-CARBON-CHIP	1/10W 15K-F		CP103P11402
92	R 3U5	R-CARBON-CHIP	1/10W 15K-F		CP103P11402
93	R 702	R-CARBON-CHIP	1/10W 22K-F		CP103P11404
94	R 1B0	R-CARBON-CHIP	1/10W 56K-F		CP103P11409
95	R 3M4	R-CARBON-CHIP	1/10W 100K-F		CP103P11502
96	R 3M5	R-CARBON-CHIP	1/10W 100K-F		CP103P11502
97	R 128	R-CARBON-CHIP	1/10W 220K-F		CP103P11506
98	R 1B6	R-CARBON-CHIP	1/10W 20K-F		CP103P11702
99	R 1B9	R-CARBON-CHIP	1/10W 30K-F		CP103P11708
100	R 325	R-CARBON-CHIP	1/10W 3.0K-F		CP103P11803
101	R 355	R-CARBON-CHIP	1/10W 3.0K-F		CP103P11803
102	R 385	R-CARBON-CHIP	1/10W 3.0K-F		CP103P11803
103	R 781	R-CARBON-CHIP	1/10W 750-F		CP103P11901
104	R 3R6	R-METAL-CHIP	1/8W 100-F	3.2X1.6	CP103P14205
105	R 3R4	R-METAL-CHIP	1/8W 150-F	3.2X1.6	CP103P14209
106	R 3R3	R-METAL-CHIP	1/8W 270-F	3.2X1.6	CP103P14305
107	R 3Z4	R-METAL-CHIP	1/8W 1.0K-F	3.2X1.6	CP103P14409
108	R 716	R-METAL-CHIP	1/8W 1.0K-F	3.2X1.6	CP103P14409
109	R 3R5	R-METAL-CHIP	1/8W 1.2K-F	3.2X1.6	CP103P14501

110	R 3A8	R-METAL-CHIP	1/8W 47K-F	3.2X1.6	CP103P14809
111	R 3E8	R-METAL-CHIP	1/8W 47K-F	3.2X1.6	CP103P14809
112	R 3J8	R-METAL-CHIP	1/8W 47K-F	3.2X1.6	CP103P14809
113	R 3A3	R-METAL-CHIP	1/8W 56K-F	3.2X1.6	CP103P14901
114	R 3E3	R-METAL-CHIP	1/8W 56K-F	3.2X1.6	CP103P14901
115	R 3J3	R-METAL-CHIP	1/8W 56K-F	3.2X1.6	CP103P14901
116	R 902	R-CEMENT-WIRE	5W 10-J		CP109D00901
117	R 906	R-CEMENT-FUSE	5W 10µ-Ñ		CP109P13201
118	VR800	VR-SEMIFIXED	1/5W B-100K		CP127C02203
119	C 957	C-ELECTROLYTIC	C-ELE 25V 47M-M		CP181P02705
120	C 1A6	C-ELECTROLYTIC	04W 25V 4.7M-M		CP181P03001
121	C 413	C-ELECTROLYTIC	04W 25V 4.7M-M		CP181P03001
122	C 3R4	C-ELECTROLYTIC	04W 25V 10M-M		CP181P03002
123	C 405	C-ELECTROLYTIC	04W 25V 10M-M		CP181P03002
124	C 407	C-ELECTROLYTIC	04W 25V 10M-M		CP181P03002
125	C 553	C-ELECTROLYTIC	04W 25V 10M-M		CP181P03002
126	C 812	C-ELECTROLYTIC	04W 25V 22M-M		CP181P03003
127	C 1A0	C-ELECTROLYTIC	04W 25V 47M-M		CP181P03005
128	C 1B0	C-ELECTROLYTIC	04W 25V 47M-M		CP181P03005
129	C 632	C-ELECTROLYTIC	04W 25V 100M-M		CP181P03006
130	C 638	C-ELECTROLYTIC	04W 25V 100M-M		CP181P03006
131	C 816	C-ELECTROLYTIC	04W 25V 100M-M		CP181P03006
132	C 400	C-ELECTROLYTIC	04W 25V 220M-M		CP181P03007
133	C 401	C-ELECTROLYTIC	04W 25V 220M-M		CP181P03007
134	C 406	C-ELECTROLYTIC	04W 25V 220M-M		CP181P03007
135	C 906	C-ELECTROLYTIC	04W 25V 220M-M		CP181P03007
136	C 3U0	C-ELECTROLYTIC	04W 50V 1M-M		CP181P03200
137	C 114	C-ELECTROLYTIC	04W 50V 2.2M-M		CP181P03201
138	C 634	C-ELECTROLYTIC	04W 50V 2.2M-M		CP181P03201
139	C 627	C-ELECTROLYTIC	04W 50V 10M-M		CP181P03204
140	C 550	C-ELECTROLYTIC	04W 50V 47M-M		CP181P03207
141	C 116	C-ELECTROLYTIC	04W 25V 4.7M-M		CP181P04001
142	C 117	C-ELECTROLYTIC	04W 25V 4.7M-M		CP181P04001
143	C 118	C-ELECTROLYTIC	04W 25V 4.7M-M		CP181P04001
144	C 125	C-ELECTROLYTIC	04W 25V 4.7M-M		CP181P04001
145	C 704	C-ELECTROLYTIC	04W 25V 4.7M-M		CP181P04001
146	C 3P3	C-ELECTROLYTIC	04W 25V 10M-M		CP181P04002
147	C 3Q3	C-ELECTROLYTIC	04W 25V 10M-M		CP181P04002
148	C 3Q8	C-ELECTROLYTIC	04W 25V 10M-M		CP181P04002
149	C 3R1	C-ELECTROLYTIC	04W 25V 10M-M		CP181P04002
150	C 734	C-ELECTROLYTIC	04W 25V 10M-M		CP181P04002
151	C 3T4	C-ELECTROLYTIC	04W 25V 22M-M		CP181P04003
152	C 735	C-ELECTROLYTIC	04W 25V 22M-M		CP181P04003
153	C 810	C-ELECTROLYTIC	04W 25V 22M-M		CP181P04003
154	C 1B5	C-ELE	04W 25V 47M-M		CP181P04005
155	C 3Q6	C-ELE	04W 25V 47M-M		CP181P04005
156	C 3R6	C-ELE	04W 25V 47M-M		CP181P04005
157	C 3R9	C-ELE	04W 25V 47M-M		CP181P04005
158	C 3T8	C-ELE	04W 25V 47M-M		CP181P04005
159	C 310	C-ELE	04W 25V 47M-M		CP181P04005
160	C 319	C-ELE	04W 25V 47M-M		CP181P04005
161	C 340	C-ELE	04W 25V 47M-M		CP181P04005
162	C 349	C-ELE	04W 25V 47M-M		CP181P04005
163	C 370	C-ELE	04W 25V 47M-M		CP181P04005
164	C 379	C-ELE	04W 25V 47M-M		CP181P04005
165	C 731	C-ELE	04W 25V 47M-M		CP181P04005
166	C 772	C-ELE	04W 25V 47M-M		CP181P04005
167	C 775	C-ELE	04W 25V 47M-M		CP181P04005
168	C 776	C-ELE	04W 25V 47M-M		CP181P04005
169	C 793	C-ELE	04W 25V 47M-M		CP181P04005
170	C 794	C-ELE	04W 25V 47M-M		CP181P04005
171	C 795	C-ELE	04W 25V 47M-M		CP181P04005

172 C 796	C-ELE	04W 25V 47M-M	CP181P04005
173 C 799	C-ELE	04W 25V 47M-M	CP181P04005
174 C 958	C-ELE	04W 25V 47M-M	CP181P04005
175 C 961	C-ELE	04W 25V 47M-M	CP181P04005
176 C 965	C-ELE	04W 25V 47M-M	CP181P04005
177 C 3P4	C-ELE	04W 25V 100M-M	CP181P04006
178 C 3Q0	C-ELE	04W 25V 100M-M	CP181P04006
179 C 3T1	C-ELE	04W 25V 100M-M	CP181P04006
180 C 3X3	C-ELE	04W 25V 100M-M	CP181P04006
181 C 311	C-ELE	04W 25V 100M-M	CP181P04006
182 C 312	C-ELE	04W 25V 100M-M	CP181P04006
183 C 341	C-ELE	04W 25V 100M-M	CP181P04006
184 C 342	C-ELE	04W 25V 100M-M	CP181P04006
185 C 371	C-ELE	04W 25V 100M-M	CP181P04006
186 C 372	C-ELE	04W 25V 100M-M	CP181P04006
187 C 713	C-ELE	04W 25V 100M-M	CP181P04006
188 C 714	C-ELE	04W 25V 100M-M	CP181P04006
189 C 728	C-ELE	04W 25V 100M-M	CP181P04006
190 C 756	C-ELE	04W 25V 100M-M	CP181P04006
191 C 758	C-ELE	04W 25V 100M-M	CP181P04006
192 C 760	C-ELE	04W 25V 100M-M	CP181P04006
193 C 763	C-ELE	04W 25V 100M-M	CP181P04006
194 C 765	C-ELE	04W 25V 100M-M	CP181P04006
195 C 813	C-ELE	04W 25V 100M-M	CP181P04006
196 C 3S8	C-ELECTROLYTIC	04W 25V 220M-M	CP181P04007
197 C 915	C-ELECTROLYTIC	04W 25V 220M-M	CP181P04007
198 C 964	C-ELECTROLYTIC	04W 25V 470M-M	CP181P04009
199 C 993	C-ELECTROLYTIC	04W 25V 470M-M	CP181P04009
200 C 559	C-ELECTROLYTIC	04W 25V 1000M-M	CP181P04100
201 C 953	C-ELECTROLYTIC	04W 25V 1000M-M	CP181P04100
202 C 9A4	C-ELECTROLYTIC	04W 10V 2200M-M	CP181P04104
203 C 955	C-ELECTROLYTIC	04W 10V 2200M-M	CP181P04104
204 C 3P6	C-ELECTROLYTIC	04W 50V 1M-M	CP181P04200
205 C 706	C-ELECTROLYTIC	04W 50V 2.2M-M	CP181P04201
206 C 707	C-ELECTROLYTIC	04W 50V 2.2M-M	CP181P04201
207 C 727	C-ELECTROLYTIC	04W 50V 2.2M-M	CP181P04201
208 C 818	C-ELECTROLYTIC	04W 50V 2.2M-M	CP181P04201
209 C 811	C-ELECTROLYTIC	04W 50V 47M-M	CP181P04207
210 C 322	C-ELECTROLYTIC	04W 100V 22M-M	CP181P04402
211 C 352	C-ELECTROLYTIC	04W 100V 22M-M	CP181P04402
212 C 382	C-ELECTROLYTIC	04W 100V 22M-M	CP181P04402
213 C 3S2	C-ELECTROLYTIC	04W 100V 33M-M	CP181P04403
214 C 3S3	C-ELECTROLYTIC	04W 100V 33M-M	CP181P04403
215 C 952	C-ELECTROLYTIC	04W 100V 100M-M	CP181P04405
216 C 328	C-ELECTROLYTIC	04W 160V 2.2M-M	CP181P04503
217 C 358	C-ELECTROLYTIC	04W 160V 2.2M-M	CP181P04503
218 C 388	C-ELECTROLYTIC	04W 160V 2.2M-M	CP181P04503
219 C 805	C-ELECTROLYTIC	04W 160V 2.2M-M	CP181P04503
220 C 3S5	C-ELECTROLYTIC	04W 160V 10M-M	CP181P04506
221 C 913	C-ELECTROLYTIC	04W 160V 10M-M	CP181P04506
222 C 3S5	C-ELECTROLYTIC	04W 160V 10M-M	CP181P04506
223 C 402	C-ELECTROLYTIC	04W 160V 22M-M	CP181P04507
224 C 808	C-ELECTROLYTIC	04W 160V 47M-M	CP181P04509
225 C 981	C-ELECTROLYTIC	04W 160V 47M-M	CP181P04509
226 C 629	C-ELECTROLYTIC	04W 200V 10M-M	CP181P04609
227 C 540	C-ELECTROLYTIC	04W 200V 220M-M	CP181P04705
228 C 977	C-ELECTROLYTIC	04W 250V 22M-M	CP181P04803
229 C 951	C-ELECTROLYTIC	04W 250V 220M-M	CP181P04807
230 C 814	C-ELECTROLYTIC	04W 450V 4.7M-M	CP181P04902
231 C 578	C-ELECTROLYTIC	04W 16V 1000M-M	CP181P04907
232 C 954	C-ELECTROLYTIC	25V 680M-M	CP181P06106
233 C 555	C-ELECTROLYTIC	16V 4700M	CP181P06700

234	C 912	C-ELE 04W 25V 150 M-M	CP181P09009
235	C 960	C-ELECTROLYTIC 04W 25V 1000M-M	CP181P09109
236	C 997	C-ELECTROLYTIC 04W 25V 1000M-M	CP181P09109
237	C 967	C-ELECTROLYTIC 04W 25V 1000M-M	CP181P09109
238	C 966	C-ELECTROLYTIC 04W 100V 150 M-M	CP181P09705
239	C 408	C-ELECTROLYTIC-NP 04 16V 10 M-M-NP	CP181P17203
240	C 3R7	C-ELECTROLYTIC-NP 04 50V 1 M-M-NP	CP181P17505
241	C 3K0	C-ELECTROLYTIC-NP 04 50V4.7 M-M-NP	CP181P17508
242	C 3K2	C-ELECTROLYTIC-NP 04 50V4.7 M-M-NP	CP181P17508
243	C 3R7	C-ELECTROLYTIC-NP 04 50V4.7 M-M-NP	CP181P17508
244	C 3T6	C-ELECTROLYTIC-NP 04 50V4.7 M-M-NP	CP181P17508
245	C 3T7	C-ELECTROLYTIC-NP 04 50V4.7 M-M-NP	CP181P17508
246	C 962	C-ELE 04W 6.3V 470M-M	CP181P18004
247	C 317	C-ELE-NP 04W 16V 10 M-M-NP	CP181P20106
248	C 318	C-ELE-NP 04W 16V 10 M-M-NP	CP181P20106
249	C 347	C-ELE-NP 04W 16V 10 M-M-NP	CP181P20106
250	C 348	C-ELE-NP 04W 16V 10 M-M-NP	CP181P20106
251	C 377	C-ELE-NP 04W 16V 10 M-M-NP	CP181P20106
252	C 378	C-ELE-NP 04W 16V 10 M-M-NP	CP181P20106
253	C 3A4	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
254	C 3A6	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
255	C 3A8	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
256	C 3E4	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
257	C 3E6	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
258	C 3E8	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
259	C 3J4	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
260	C 3J6	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
261	C 3J8	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
262	C 7A1	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
263	C 7A2	C-ELE-NP 04W 16V 33 M-M-NP	CP181P20108
264	C 3A7	C-ELE-NP 04W 25V 4.7 M-M-NP	CP181P20205
265	C 3E7	C-ELE-NP 04W 25V 4.7 M-M-NP	CP181P20205
266	C 3J7	C-ELE-NP 04W 25V 4.7 M-M-NP	CP181P20205
267	C 3Q7	C-ELE-NP 04W 25V 4.7 M-M-NP	CP181P20205
268	C 779	C-ELE-NP 25V 4.7MF-M	CP181P24103
269	C 516	C-ELE 04W 250V 220M-M	CP181P27407
270	C 905	C-ELE 400V 680MF	CP181P31001
271	C 968	C-ELECTROLYTIC 16V 2200MF	CP181P32001
272	C 956	C-ELECTROLYTIC 6.3V 2200MF	CP181P33001
273	C 980	C-ELECTROLYTIC 6.3V 2200MF	CP181P33001
274	C 9A6	C-ELE 6.3V 1000MF	CP181P34008
275	C 9A7	C-ELE 6.3V 1000MF	CP181P34008
276	AG201	SURGE-ABSORBER DSP-201M	CP252P00102
277	AG211	SURGE-ABSORBER DSP-201M	CP252P00102
278	AG221	SURGE-ABSORBER DSP-201M	CP252P00102
279	AG601	SURGE-ABSORBER DSP-201M	CP252P00102
280	AG603	SURGE-ABSORBER DSP-201M	CP252P00102
281	AG700	SURGE-ABSORBER DSP-201MC04F	CP252P00103
282	AG231	SURGE-ABSORBER DSP-301N	CP252P00101
283	AG232	SURGE-ABSORBER AG15PC152FB-K2M	CP252P00502
284	AG500	SURGE-ABSORBER AG15PC152FB-K2M	CP252P00502
285	AG602	SURGE-ABSORBER AG15PC152FB-K2M	CP252P00502
286	Q 809	TRANSISTOR 2SA 1370 (MD)	CP260P00101
287	Q 957	TRANSISTOR 2SA1020	CP260P01201
288	Q 540	TRANSISTOR 2SC1815 BL GR Y	CP260P05702
289	Q 541	TRANSISTOR 2SC1815 BL GR Y	CP260P05702
290	Q 545	TRANSISTOR 2SC1815 BL GR Y	CP260P05702
291	Q 547	TRANSISTOR 2SC1815 BL GR Y	CP260P05702
292	Q 811	TRANSISTOR 2SC1815 BL GR Y	CP260P05702
293	Q 902	TRANSISTOR 2SC1815 BL GR Y	CP260P05702
294	Q 954	TRANSISTOR 2SC1815 BL GR Y	CP260P05702
295	Q 958	TRANSISTOR 2SC1815 BL GR Y	CP260P05702

296 Q 960	TRANSISTOR	2SC1815 BL GR Y	CP260P05702
297 Q 400	TRANSISTOR	2SC2909S	CP260P07001
298 Q 608	TRANSISTOR	2SC2909S	CP260P07001
299 Q 805	TRANSISTOR	2SC2909S	CP260P07001
300 Q 808	TRANSISTOR	2SC2909S	CP260P07001
301 Q 807	TRANSISTOR	2SA1207S	CP260P07002
302 Q 953	TRANSISTOR	2SC3332-S	CP260P07302
303 Q 372	FET-MOS-CHIP	2SK360-E(IGE)	CP260P09102
304 Q 373	FET-MOS-CHIP	2SK360-E(IGE)	CP260P09102
305 Q 307	TRANSISTOR-CHIP	2SA1255-Y	CP260P09801
306 Q 337	TRANSISTOR-CHIP	2SA1255-Y	CP260P09801
307 Q 367	TRANSISTOR-CHIP	2SA1255-Y	CP260P09801
308 Q 308	TRANSISTOR	2SC3138-Y	CP260P09901
309 Q 338	TRANSISTOR	2SC3138-Y	CP260P09901
310 Q 368	TRANSISTOR	2SC3138-Y	CP260P09901
311 Q 102	TRANSISTOR-CHIP	2SC2412K-R	CP260P11001
312 Q 103	TRANSISTOR-CHIP	2SC2412K-R	CP260P11001
313 Q 107	TRANSISTOR-CHIP	2SC2412K-R	CP260P11001
314 Q 108	TRANSISTOR-CHIP	2SC2412K-R	CP260P11001
315 Q 3P4	TRANSISTOR	2SA1462-T2B,Y34	CP260P11901
316 Q 301	TRANSISTOR	2SA1462-T2B,Y34	CP260P11901
317 Q 331	TRANSISTOR	2SA1462-T2B,Y34	CP260P11901
318 Q 361	TRANSISTOR	2SA1462-T2B,Y34	CP260P11901
319 Q 546	TRANSISTOR	2SA1015	CP260P13001
320 Q 548	TRANSISTOR	2SA1015	CP260P13001
321 Q 810	TRANSISTOR	2SA1015	CP260P13001
322 Q 955	TRANSISTOR	2SC2240	CP260P13801
323 Q 959	TRANSISTOR	2SC2240	CP260P13801
324 Q 3P1	TRANSISTOR-CHIP	2SC3338AR02	CP260P14401
325 Q 305	TRANSISTOR-CHIP	2SC3338AR02	CP260P14401
326 Q 306	TRANSISTOR-CHIP	2SC3338AR02	CP260P14401
327 Q 335	TRANSISTOR-CHIP	2SC3338AR02	CP260P14401
328 Q 336	TRANSISTOR-CHIP	2SC3338AR02	CP260P14401
329 Q 365	TRANSISTOR-CHIP	2SC3338AR02	CP260P14401
330 Q 366	TRANSISTOR-CHIP	2SC3338AR02	CP260P14401
331 Q 609	TRANSISTOR	2SC4200	CP260P18301
332 Q 812	TRANSISTOR	2SC4632	CP260P18501
333 Q 801	TRANSISTOR	2SC3811	CP260P19001
334 Q 802	TRANSISTOR	2SC3811	CP260P19001
335 Q 803	TRANSISTOR	2SC3811	CP260P19001
336 Q 3P9	TRANSISTOR	2SB709A	CP260P19601
337 Q 3Q3	TRANSISTOR	2SB709A	CP260P19601
338 Q 3Q5	TRANSISTOR	2SB709A	CP260P19601
339 Q 100	TRANSISTOR	2SD601A	CP260P19701
340 Q 101	TRANSISTOR	2SD601A	CP260P19701
341 Q 3P7	TRANSISTOR	2SD601A	CP260P19701
342 Q 3P8	TRANSISTOR	2SD601A	CP260P19701
343 Q 3Q0	TRANSISTOR	2SD601A	CP260P19701
344 Q 3Q1	TRANSISTOR	2SD601A	CP260P19701
345 Q 3Q2	TRANSISTOR	2SD601A	CP260P19701
346 Q 3Q4	TRANSISTOR	2SD601A	CP260P19701
347 Q 3Q7	TRANSISTOR	2SD601A	CP260P19701
348 Q 700	TRANSISTOR	2SD601A	CP260P19701
349 Q 701	TRANSISTOR	2SD601A	CP260P19701
350 Q 702	TRANSISTOR	2SD601A	CP260P19701
351 Q 604	IGBT	1MB12-140	CP260P19801
352 Q 522	MOS-FET	2SJ307	CP260P20202
353 Q 521	MOS-FET	2SJ307-TOK-CBC14	CP260P20205
354 Q 605	MOS-FET	2SJ307-TOK-CBC14	CP260P20205
355 Q 401	TRANSISTOR	2SC1473-R	CP260P22301
356 Q 544	MOS-FET	2SJ133	CP260P22601
357 Q 901	TRANSISTOR	2SD1640-R	CP260P23301

358 Q 109	FET-CHIP	2SK1062	CP260P24601
359 Q 518	MOS-FET	IRFI640G(FORMING)	CP260P24903
360 Q 519	MOS-FET	IRFI640G(FORMING)	CP260P24903
361 Q 520	MOS-FET	IRFI640G(FORMING)	CP260P24903
362 Q 813	TRANSISTOR	2SC4634	CP260P25001
363 Q 3P6	MOS-FET	2SK210-Y	CP260P25701
364 Q 302	MOS-FET	2SK210-Y	CP260P25701
365 Q 332	MOS-FET	2SK210-Y	CP260P25701
366 Q 362	MOS-FET	2SK210-Y	CP260P25701
367 Q 3Q6	TRANSISTOR	2SB1001BJTR	CP260P25801
368 Q 704	TRANSISTOR	2SB1001BJTR	CP260P25801
369 Q 705	TRANSISTOR	2SB1001BJTR	CP260P25801
370 Q 706	TRANSISTOR	2SB1001BJTR	CP260P25801
371 Q 3P2	TRANSISTOR	2SC2733HTR	CP260P25901
372 Q 3P3	TRANSISTOR	2SC2733HTR	CP260P25901
373 Q 3P5	TRANSISTOR	2SC2733HTR	CP260P25901
374 Q 309	TRANSISTOR	2SC2733HTR	CP260P25901
375 Q 310	TRANSISTOR	2SC2733HTR	CP260P25901
376 Q 311	TRANSISTOR	2SC2733HTR	CP260P25901
377 Q 339	TRANSISTOR	2SC2733HTR	CP260P25901
378 Q 340	TRANSISTOR	2SC2733HTR	CP260P25901
379 Q 341	TRANSISTOR	2SC2733HTR	CP260P25901
380 Q 369	TRANSISTOR	2SC2733HTR	CP260P25901
381 Q 370	TRANSISTOR	2SC2733HTR	CP260P25901
382 Q 371	TRANSISTOR	2SC2733HTR	CP260P25901
383 Q 303	MOS-FET	3SK263	CP260P26501
384 Q 304	MOS-FET	3SK263	CP260P26501
385 Q 333	MOS-FET	3SK263	CP260P26501
386 Q 334	MOS-FET	3SK263	CP260P26501
387 Q 363	MOS-FET	3SK263	CP260P26501
388 Q 364	MOS-FET	3SK263	CP260P26501
389 Q 507	MOS-FET	2SK1938	CP260P26801
390 Q 511	MOS-FET	IRFU224	CP260P27001
391 Q 512	MOS-FET	IRFU224	CP260P27001
392 Q 531	MOS-FET	IRF 9540	CP260P27201
393 Q 515	MOS-FET	2SK2098-01M	CP260P27301
394 Q 516	MOS-FET	2SK2098-01M	CP260P27301
395 Q 517	MOS-FET	2SK2098-01M	CP260P27301
396 Q 506	TRANSISTOR	2SC5244A	CP260P28202
397 Q 952	TRANSISTOR	2SA1908	CP260P28301
398 Q 804	TRANSISTOR	2SC3954-E,F	CP260P51001
399 IC303	IC-LINEAR-CHIP	NJM431U/RC431U	CP263P02801
400 IC333	IC-LINEAR-CHIP	NJM431U/RC431U	CP263P02801
401 IC363	IC-LINEAR-CHIP	NJM431U/RC431U	CP263P02801
402 IC951	IC	SE140N	CP263P04501
403 IC111	IC	CXA1268P	CP263P06101
404 IC956	IC-REGULATOR	AN7905F	CP263P07801
405 IC952	IC-REGULATOR	AN7712F	CP263P08401
406 IC700	IC	LA7860	CP263P08601
407 IC955	IC-REGULATOR	AN79N12	CP263P09701
408 IC710	IC-REGULATOR	Ï²,ÛPC 78L 05T	CP263P11501
409 IC954	IC	AN7705F	CP263P11601
410 IC902	IC	STR-S6709	CP263P11801
411 IC503	IC	TDA2040-V	CP263P12001
412 IC502	IC-LINEAR	TL082CP	CP263P51001
413 IC112	IC LINEAR (SOP)	TL082CPS	CP263P52101
414 IC301	IC	LM2202N	CP263P90201
415 IC331	IC	LM2202N	CP263P90201
416 IC361	IC	LM2202N	CP263P90201
417 D 901	DIODE	EU2A/RGP10G	CP264D00601
418 D 620	DIODE	RU4DS 1500V-K1(FORMI	CP264P05305
419 D 508	DIODE	RG2A2	CP264P05801

420	D 509	DIODE	RG2A2		CP264P05801
421	D 547	DIODE	RG2A2		CP264P05801
422	D 548	DIODE	RG2A2		CP264P05801
423	D 9A1	LED	PY3822K	YELLOW (MI)	CP264P06401
424	D 555	DIODE	HZ3A3		CP264P07103
425	D 556	DIODE	HZ3A3		CP264P07103
426	D 544	DIODE	HZ3B2		CP264P07105
427	D 958	DIODE	HZ7C2		CP264P07504
428	D 381	DIODE	HZ12C3		CP264P08108
429	D 386	DIODE	HZ12C3		CP264P08108
430	D 549	DIODE	HZ16-1		CP264P08202
431	D 550	DIODE	HZ16-1		CP264P08202
432	D 551	DIODE	HZ16-1		CP264P08202
433	D 552	DIODE	HZ16-1		CP264P08202
434	D 553	DIODE	HZ16-1		CP264P08202
435	D 554	DIODE	HZ16-1		CP264P08202
436	D 621	DIODE	HZ16-1		CP264P08202
437	D 821	DIODE	HZ30-2		CP264P08401
438	D 517	DIODE	RG2A		CP264P09201
439	D 3P3	DIODE-ZENER-CHIP	HZK5BTR		CP264P10201
440	D 3P4	DIODE-ZENER-CHIP	HZK5BTR		CP264P10201
441	D 700	DIODE-ZENER-CHIP	HZK5BTR		CP264P10201
442	D 106	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
443	D 107	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
444	D 108	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
445	D 109	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
446	D 110	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
447	D 112	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
448	D 113	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
449	D 114	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
450	D 115	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
451	D 116	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
452	D 117	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
453	D 118	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
454	D 119	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
455	D 121	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
456	D 122	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
457	D 123	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
458	D 124	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
459	D 125	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
460	D 126	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
461	D 127	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
462	D 128	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
463	D 129	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
464	D 130	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
465	D 384	DIODE-ZENER-CHIP	HZK11ATR LLD		CP264P10303
466	D 135	DIODE-ZENER-CHIP	HZK11BTR LLD		CP264P10304
467	D 382	DIODE-ZENER-CHIP	HZK15TR LLD		CP264P10309
468	D 105	DIODE-CHIP	HSK120TR LLD		CP264P10501
469	D 131	DIODE-CHIP	HSK120TR LLD		CP264P10501
470	D 132	DIODE-CHIP	HSK120TR LLD		CP264P10501
471	D 133	DIODE-CHIP	HSK120TR LLD		CP264P10501
472	D 134	DIODE-CHIP	HSK120TR LLD		CP264P10501
473	D 3P1	DIODE-CHIP	HSK120TR LLD		CP264P10501
474	D 3P2	DIODE-CHIP	HSK120TR LLD		CP264P10501
475	D 3P9	DIODE-CHIP	HSK120TR LLD		CP264P10501
476	D 3Q0	DIODE-CHIP	HSK120TR LLD		CP264P10501
477	D 3Q1	DIODE-CHIP	HSK120TR LLD		CP264P10501
478	D 3Q2	DIODE-CHIP	HSK120TR LLD		CP264P10501
479	D 3R0	DIODE-CHIP	HSK120TR LLD		CP264P10501
480	D 3R1	DIODE-CHIP	HSK120TR LLD		CP264P10501
481	D 3R3	DIODE-CHIP	HSK120TR LLD		CP264P10501

482 D 302	DIODE-CHIP	HSK120TR LLD	CP264P10501
483 D 332	DIODE-CHIP	HSK120TR LLD	CP264P10501
484 D 362	DIODE-CHIP	HSK120TR LLD	CP264P10501
485 D 380	DIODE-CHIP	HSK120TR LLD	CP264P10501
486 D 703	DIODE-CHIP	HSK120TR LLD	CP264P10501
487 D 704	DIODE-CHIP	HSK120TR LLD	CP264P10501
488 D 705	DIODE-CHIP	HSK120TR LLD	CP264P10501
489 D 955	DIODE	EGP30D 20MM	CP264P11501
490 D 956	DIODE	EGP30D 20MM	CP264P11501
491 D 980	DIODE	EGP30D 20MM	CP264P11501
492 D 515	DIODE	EU2A	CP264P12401
493 D 518	DIODE	EU2A	CP264P12401
494 D 614	DIODE	EU2A	CP264P12401
495 D 3Q8	DIODE-CHIP	HSK83TR	CP264P13001
496 D 3Q9	DIODE-CHIP	HSK83TR	CP264P13001
497 D 306	DIODE-CHIP	HSK83TR	CP264P13001
498 D 307	DIODE-CHIP	HSK83TR	CP264P13001
499 D 336	DIODE-CHIP	HSK83TR	CP264P13001
500 D 337	DIODE-CHIP	HSK83TR	CP264P13001
501 D 366	DIODE-CHIP	HSK83TR	CP264P13001
502 D 367	DIODE-CHIP	HSK83TR	CP264P13001
503 D 953	DIODE	RL4Z-K1	CP264P13403
504 D 955	DIODE	RL4Z-K1	CP264P13403
505 D 954	DIODE	RGP15J-6040	CP264P15101
506 D 960	DIODE	RGP15J-6040	CP264P15101
507 D 982	DIODE	RGP15J-6040	CP264P15101
508 D 954	DIODE	RGP15J-L6431(15MM)	CP264P15103
509 D 902	DIODE	RGP10D	CP264P15401
510 D 903	DIODE	RGP10D	CP264P15401
511 D 985	DIODE	RGP10D	CP264P15401
512 Q 956	THYRISTOR	SF0R3G42	CP264P17203
513 D 612	ZENER	HZS5ALL	CP264P17307
514 D 543	ZENER	HZS5CLL	CP264P17309
515 D 539	DIODE-ZENER	HZS6C1L	CP264P18007
516 D 613	DIODE-ZENER	HZS6C1L	CP264P18007
517 D 810	DIODE-ZENER	HZS6C1L	CP264P18007
518 D 904	DIODE-ZENER	HZS7C2L	CP264P18107
519 D 506	DIODE-ZENER	HZS11A1L	CP264P18208
520 D 528	DIODE-ZENER	HZS11A1L	CP264P18208
521 D 530	DIODE-ZENER	HZS11A1L	CP264P18208
522 D 540	DIODE-ZENER	HZS11A1L	CP264P18208
523 D 608	DIODE-ZENER	HZS11A1L	CP264P18208
524 D 516	DIODE-ZENER	HZS16-2L	CP264P18501
525 D 519	DIODE-ZENER	HZS16-2L	CP264P18501
526 D 804	DIODE-ZENER	HZS33-2L	CP264P18702
527 D 814	DIODE-ZENER	HZS33-2L	CP264P18702
528 D 816	DIODE-ZENER	HZS33-2L	CP264P18702
529 D 951	DIODE	RGP10K-5008	CP264P21801
530 D 981	DIODE	RGP10K-5008	CP264P21801
531 D 906	DIODE	MPG06JG23	CP264P22801
532 D 952	DIODE	RGP30G	CP264P22901
533 D 953	DIODE	RGP30G	CP264P22901
534 D 529	DIODE	S2L60	CP264P23101
535 D 531	DIODE	S2L60	CP264P23101
536 D 542	DIODE	S2L60	CP264P23101
537 D 970	DIODE	ST05-16	CP264P23401
538 D 3Q5	DIODE	HSK110-TR	CP264P23501
539 D 303	DIODE	HSK110-TR	CP264P23501
540 D 308	DIODE	HSK110-TR	CP264P23501
541 D 309	DIODE	HSK110-TR	CP264P23501
542 D 310	DIODE	HSK110-TR	CP264P23501
543 D 333	DIODE	HSK110-TR	CP264P23501

544 D 338	DIODE	HSK110-TR		CP264P23501
545 D 339	DIODE	HSK110-TR		CP264P23501
546 D 340	DIODE	HSK110-TR		CP264P23501
547 D 363	DIODE	HSK110-TR		CP264P23501
548 D 368	DIODE	HSK110-TR		CP264P23501
549 D 369	DIODE	HSK110-TR		CP264P23501
550 D 370	DIODE	HSK110-TR		CP264P23501
551 D 373	DIODE	HSK110-TR		CP264P23501
552 D 374	DIODE	HSK110-TR		CP264P23501
553 D 375	DIODE	HSK110-TR		CP264P23501
554 D 376	DIODE	HSK110-TR		CP264P23501
555 D 377	DIODE	HSK110-TR		CP264P23501
556 D 378	DIODE	HSK110-TR		CP264P23501
557 D 702	DIODE	EGP10D FORMING		CP264P25001
558 D 813	DIODE	EGP10D FORMING		CP264P25001
559 D 510	DIODE	FMP-G5HS		CP264P25101
560 D 909	DIODE	EH-1Z		CP264P25201
561 D 967	DIODE-ZENER	HZ3.0BP		CP264P25409
562 D 808	DIODE	RG-1C		CP264P25801
563 D 822	DIODE	RG-1C		CP264P25801
564 D 609	DIODE	RG 4 LF-J1	17.5MM	CP264P50103
565 D 301	DIODE	HSM123		CP264P51301
566 D 331	DIODE	HSM123		CP264P51301
567 D 361	DIODE	HSM123		CP264P51301
568 D 507	DIODE	RL2Z		CP264P52201
569 D 808	DIODE	RP1H-LF-B1		CP264P52302
570 RP901	POSISTOR	903P54E150MR17	(MI)	CP265P05101
571 RV900	VARISTOR	ERZC20DK151		CP265P06401
572 IC110	IC-DIGITAL	PST-520C		CP266P06201
573 IC1	IC-MOS-CHIP	DAC 8840FS		CP266P11202
574 IC2	IC-MOS-CHIP	DAC 8840FS		CP266P11202
575 IC107	IC-MOS-SOP	ADM232LJR		CP266P16201
576 IC109	IC	SP720AB(SOP)		CP266P16601
577 IC709	IC	SP720AB(SOP)		CP266P16601
578 IC105	E2PROM	24LC65 I/SM		CP266P16701
579 IC3P3	IC	HD74LS123FP-TR		CP266P17101
580 IC3P4	IC	HD74AC02FP		CP266P17601
581 IC3P9	IC	HD74LS257FP		CP266P17701
582 IC113	IC-MOS-EEPROM	24LC21SN		CP266P18201
583 IC101	IC-MOS	M37702M6B-137FP		CP266P18301
584 IC3P2	IC-PLL	M35020SP		CP266P90201
585 IC3P1	IC	M35042-061SP		CP266P90301
586 IC302	HIC	VPA 15-LA		CP267P02602
587 IC332	HIC	VPA 15-LA		CP267P02602
588 IC362	HIC	VPA 15-LA		CP267P02602
589 IC3P5	SYNC-IC	MB434108		CP267P03801
590 IC103	IC	MBCG24512		CP267P04901
591 IC102	IC	MB87867PF		CP267P05001
592 IC901	HIC	MJ2400		CP267P06101
593 IC708	HIC	HIC-CONTROL(1)		CP267P07301
594 IC701	HIC	HIC-CONTROL2		CP267P07502
595 IC600	HIC	HIC-SR		CP267P07602
596 IC500	HIC	HIC-CS/CR2		CP267P07703
597 IC400	IC	STK792-110		CP267P08901
598 IC904	PHOTO-COUPLER	TLP634(D4-GB-LF2)		CP268P00301
599 IC711	PHOTO-COUPLER	TLP 124		CP268P00601
600 IC712	IC LSTTL(E-SOP)	HD74LS221SOP/SN74LS		CP270P02603
601 F 952	FUSE	25101.5 1.5A		CP283P01603
602 F 951	FUSE	251003 3A		CP283P01606
603 F 953	FUSE	251003 3A		CP283P01606
604 F 954	FUSE	251003 3A		CP283P01606
605 F 957	FUSE	251003 3A		CP283P01606

606 F 958	FUSE	251003 3A	CP283P01606
607 F 955	FUSE	251005 5A	CP283P01609
608 F 956	FUSE	251005 5A	CP283P01609
609 F 901	FUSE	215-T4.0AH 250V	CP283P01707
610 X 100	CRYSTAL	MA-406(40MHZ)	CP285P00501
611 RY901	RELAY	G2R-2A-SKVD DC12	CP287P02102
612 L 400	COIL-RF	10MH-K 100 SO	CP321P03007
613 L 401	COIL-RF	10MH-K 100 SO	CP321P03007
614 L 604	COIL-RF	27MH-K	CP321P03102
615 L 606	COIL-RF	27MH-K	CP321P03102
616 L 960	COIL-RF	33MH-K 330 SO	CP321P03103
617 L 961	COIL-RF	33MH-K 330 SO	CP321P03103
618 L 507	COIL-RF	100MH-K 101 SO	CP321P03109
619 L 509	COIL-RF	100MH-K 101 SO	CP321P03109
620 L 951	COIL-RF	100MH-K 101 SO	CP321P03109
621 L 953	COIL-RF	100MH-K 101 SO	CP321P03109
622 L 955	COIL-RF	100MH-K 101 SO	CP321P03109
623 L 956	COIL-RF	100MH-K 101 SO	CP321P03109
624 L 957	COIL-RF	100MH-K 101 SO	CP321P03109
625 L 521	COIL-RF	330MH-K 331 SO	CP321P03205
626 L508	COIL-RF	560MH-K 561 SO	CP321P03208
627 L 700	COIL-RF	1000M-K	CP321P05106
628 L 524	COIL-CHOKE	4.7MH-K 4R7 SO	CP321P06005
629 L 523	COIL-RF	220UH (MI)	CP321P08201
630 L 529	COIL-RF	SM4L01-0.12MH (MI)	CP321P11001
631 L 955	COIL-CHOKE	LHL10 101K	CP321P12004
632 L 524	COIL-PEAKING	4.7MH-K 4R7 SO	CP325P01009
633 L506	COIL-H-LIN	LME023-01	CP333P02801
634 T 601	F.B.T	ETF39L88AZ (MD)	CP334P04602
635 T 500	H.D.T	H.D.T(T-DRIVE)	CP336P01601
636 T 501	H.D.T	H.D.T(T-OUT) (MI)	CP336P01801
637 T 901	POWER-TRANS	TME095	CP350P05801
638 L 901	LINE-FILTER	(MI)	CP351P03304
639	COIL-DEGAUSSING	THN9105K (MT)	CP409B01801
640	R-COIL	THN9105K (MI)	CP409C01302
641	P-COIL	THN9105K (MI)	CP409C01401
642 L 526	TRANS-CHOKE	1MH (MI)	CP409P05101
643 L 600	TRANS-CHOKE	1.6MH (MI)	CP409P05201
644 L 516	TRANS-CHOKE	053-1/054-1 (MI)	CP409P05901
645	CORE-FERRITE	RISC-6-F (MI)	CP410P00303
646 L 500	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
647 L 501	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
648 L 502	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
649 L 514	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
650 L 515	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
651 L 519	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
652 L 520	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
653 L 603	BEAD-FERRITE	LFW7A-M3R2	CP410P01001
654 L 527	BEAD-FERRITE	LFW7A-M5R2	CP410P01101
655 L 232	BEAD-FERRITE	FBR07HA850	CP410P01201
656 L 3P3	BEAD-FERRITE	FBR07HA850	CP410P01201
657 L 3P4	BEAD-FERRITE	FBR07HA850	CP410P01201
658 L 3P5	BEAD-FERRITE	FBR07HA850	CP410P01201
659 L 3P6	BEAD-FERRITE	FBR07HA850	CP410P01201
660 L 3P7	BEAD-FERRITE	FBR07HA850	CP410P01201
661 L 402	BEAD-FERRITE	FBR07HA850	CP410P01201
662 L 902	BEAD-FERRITE	FBR07HA850	CP410P01201
663 LC301	BEAD-FERRITE	FBR07HA850	CP410P01201
664 LC302	BEAD-FERRITE	FBR07HA850	CP410P01201
665 LC303	BEAD-FERRITE	FBR07HA850	CP410P01201
666 LC304	BEAD-FERRITE	FBR07HA850	CP410P01201
667 LC331	BEAD-FERRITE	FBR07HA850	CP410P01201

668 LC332	BEAD-FERRITE	FBR07HA850	CP410P01201
669 LC333	BEAD-FERRITE	FBR07HA850	CP410P01201
670 LC334	BEAD-FERRITE	FBR07HA850	CP410P01201
671 LC361	BEAD-FERRITE	FBR07HA850	CP410P01201
672 LC362	BEAD-FERRITE	FBR07HA850	CP410P01201
673 LC363	BEAD-FERRITE	FBR07HA850	CP410P01201
674 LC364	BEAD-FERRITE	FBR07HA850	CP410P01201
675 LC365	BEAD-FERRITE	FBR07HA850	CP410P01201
676 L 108	BEAD-FERRITE	FBR07VB850	CP410P01203
677 L 202	BEAD-FERRITE	FBR07VB850	CP410P01203
678 L 212	BEAD-FERRITE	FBR07VB850	CP410P01203
679 L 222	BEAD-FERRITE	FBR07VB850	CP410P01203
680 L 3P1	FERRITE-CHIP	BK2125HM601	CP410P04105
681 L 3P2	FERRITE-CHIP	BK2125HM601	CP410P04105
682 L 3P8	FERRITE-CHIP	BK2125HM601	CP410P04105
683 L 3P9	FERRITE-CHIP	BK2125HM601	CP410P04105
684 L 3Q0	FERRITE-CHIP	BK2125HM601	CP410P04105
685 L 3Q2	FERRITE-CHIP	BK2125HM601	CP410P04105
686 L 3Q3	FERRITE-CHIP	BK2125HM601	CP410P04105
687 L 3Q4	FERRITE-CHIP	BK2125HM601	CP410P04105
688 L 3Q5	FERRITE-CHIP	BK2125HM601	CP410P04105
689 L 3Q6	FERRITE-CHIP	BK2125HM601	CP410P04105
690 L 3Q7	FERRITE-CHIP	BK2125HM601	CP410P04105
691 L 3Q8	FERRITE-CHIP	BK2125HM601	CP410P04105
692 L 3Q9	FERRITE-CHIP	BK2125HM601	CP410P04105
693 L 3R0	FERRITE-CHIP	BK2125HM601	CP410P04105
694 L 3R1	FERRITE-CHIP	BK2125HM601	CP410P04105
695 L 3R2	FERRITE-CHIP	BK2125HM601	CP410P04105
696 L 3R3	FERRITE-CHIP	BK2125HM601	CP410P04105
697 L 3R4	FERRITE-CHIP	BK2125HM601	CP410P04105
698 L 3R5	FERRITE-CHIP	BK2125HM601	CP410P04105
699 L 3R6	FERRITE-CHIP	BK2125HM601	CP410P04105
700 L 3R7	FERRITE-CHIP	BK2125HM601	CP410P04105
701 L 3R8	FERRITE-CHIP	BK2125HM601	CP410P04105
702 L 3R9	FERRITE-CHIP	BK2125HM601	CP410P04105
703 L 3S0	FERRITE-CHIP	BK2125HM601	CP410P04105
704 L 3S1	FERRITE-CHIP	BK2125HM601	CP410P04105
705 L 3S2	FERRITE-CHIP	BK2125HM601	CP410P04105
706 L 3S3	FERRITE-CHIP	BK2125HM601	CP410P04105
707 L 3S4	FERRITE-CHIP	BK2125HM601	CP410P04105
708 L 3S5	FERRITE-CHIP	BK2125HM601	CP410P04105
709 L 301	FERRITE-CHIP	BK2125HM601	CP410P04105
710 L 331	FERRITE-CHIP	BK2125HM601	CP410P04105
711 L 361	FERRITE-CHIP	BK2125HM601	CP410P04105
712 SW1F1	ROTALY-ENCODER	EC16B24104	CP430P00101
713 SW3P1	SW-SLIDE	ESD-14540	CP431C00801
714 SW9A1	SWITCH-PUSH	ESB91632A	CP432P01201
715	CUSHION	FOAMED-P.S THN9105K	CP803A05801
716	ASSY PCB MAIN	WITH PCB DBF/G1 THN9105	CT920A12001
717	ASSY PCB VIDEO	THN9105	CT920A12101
718	ASSY PCB CONTROL	THN9105	CT920B28401
719	ASSY PCB CRT	THN9105	CT920C10201
720	ASSY PCB POWER/SW	THN9105	CT920C10301
721	ASSY PCB ENCODER	THN9105	CT920C10401
722	ASSY PCB CONNECTOR	THN9105	CT920C10501
723	ASSY PCB LED	THN9105	CT920C10601
724 R 407	R-FUSE	1/2W 470-J 471 RNF-H	QX103P39201
725 R 853	R-FUSE	1/2W 1.0K-J 102 RNF-H	QX103P39205
726 R 853	R-FUSE	1/2W 1.0K-J 102 RNF-	QX103P39205
727 R 5H2	R-FUSE	1/2W 10K-J	QX103P39307
728 R 571	R-FUSE	1/2W 0.22-J	QX103P39702
729 R 649	R-FUSE	1/2W 1.2-J 1R2 RNF-H	QX103P39801

730 SW101	VR-CHANNEL-PLESETTERBAND-SW	1-2	(MI)	QX129P00709
731 C 9A3	C-ELECTROLYTIC	04W 10V 47M-M	470 SO	QX181P20103
732 C 604	C-ELECTROLYTIC	04W 16V 220M-M	221 SO	QX181P20205
733 C 567	C-ELECTROLYTIC	04W 100V 10M-M	100 SO	QX181P20609
734 C 903	C-CERAMIC-AC	F VA1 4700P-M	472 SO	QX189P02707
735 Q 714	TRANSISTOR	2SC2274-F FORMING		QX260C41603
736 Q 551	TRANSISTOR	2SC2230-Y,GR		QX260P38603
737 Q 552	TRANSISTOR	2SC2230-Y,GR		QX260P38603
738 Q 513	TRANSISTOR	2SC2482		QX260P42201
739 Q 514	TRANSISTOR	2SC2482		QX260P42201
740 Q 550	TRANSISTOR	2SC2688-M.N		QX260P42504
741 D 400	DIODE	1S2076A/1S2471		QX264P04508
742 D 401	DIODE	1S2076A/1S2471		QX264P04508
743 D 402	DIODE	1S2076A/1S2471		QX264P04508
744 D 403	DIODE	1S2076A/1S2471		QX264P04508
745 D 405	DIODE	1S2076A/1S2471		QX264P04508
746 D 406	DIODE	1S2076A/1S2471		QX264P04508
747 D 407	DIODE	1S2076A/1S2471		QX264P04508
748 D 536	DIODE	1S2076A/1S2471		QX264P04508
749 D 537	DIODE	1S2076A/1S2471		QX264P04508
750 D 538	DIODE	1S2076A/1S2471		QX264P04508
751 D 557	DIODE	1S2076A/1S2471		QX264P04508
752 D 619	DIODE	1S2076A/1S2471		QX264P04508
753 D 800	DIODE	1S2076A/1S2471		QX264P04508
754 D 805	DIODE	1S2076A/1S2471		QX264P04508
755 D 806	DIODE	1S2076A/1S2471		QX264P04508
756 D 807	DIODE	1S2076A/1S2471		QX264P04508
757 D 961	DIODE	1S2076A/1S2471		QX264P04508
758 D 964	DIODE	1S2076A/1S2471		QX264P04508
759 D 966	DIODE	1S2076A/1S2471		QX264P04508
760 D 983	DIODE	1S2076A/1S2471		QX264P04508
761 D 404	DIODE	1SS83		QX264P36701
762 D 801	DIODE	1SS83		QX264P36701
763 D 957	DIODE	1SS83		QX264P36701
764 VR601	VR-SEMIFIXED	1/2W B-1Kµ-Ñ		RX129C50705
765 VR600	VR-SEMIFIXED	1/2W B-50Kµ-Ñ		RX129C50804
766 IC505	IC	TL431CLPB		RX277P65001
767 IC800	IC	TL431CLPB		RX277P65001